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Final Report

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**National Highway
Traffic Safety
Administration**

Drunk Driving Warning System (DDWS)

Volume II
Field Test Evaluation

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16. Abstract

The Drunk Driving Warning System (DDWS) is a vehicle-mounted device for testing driver impairment and activating alarms. The driver must pass a steering competency test (the Critical Tracking Task or CTT) in order to drive the car in a normal manner. The emergency flasher system operates when the test is failed; and if the car is driven faster than 10 mph, the horn honks periodically, once per second. The CTT/DDWS concept and hardware were developed under earlier contracts. The purpose of this work was to evaluate the feasibility of the concept, both in its sensitivity to alcohol impairment and in terms of various practical considerations in assigning the device to DWIs as a judicial sanction in a probtationary setting.

Volume II of the final report describes the field test conducted to 1) test the performance of the CTT/DDWS in an operational setting, and 2) identify and solve the practical operational issues related to CTT/DDWS implementation through a municipal court system under various state laws and state agency operating procedures. Background is given on the pursuit of legal feasibility, and obtaining the support and/or cooperation of state and local agencies. Subject selection, processing, and assignment procedures are reviewed. Subject CTT/DDWS performance is analyzed and no inconsistencies are evident in comparison with the Volume I controlled laboratory results. Debriefing information and other project experience is summarized to address issues of user and public acceptance of the DDWS concept.

Based on analysis of field test results and comparison with previous laboratory findings, the CTT/DDWS is shown to effectively detect driver impairment. Implementation of DDWS through a court system with the assistance of state agencies is shown to be feasible. Future options for the current DDWS equipment and future developments are also discussed.

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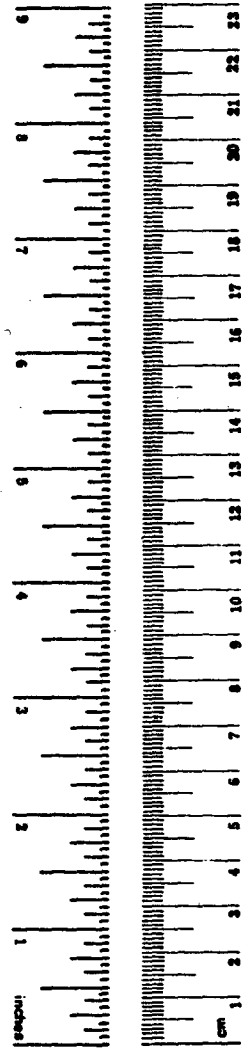
METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

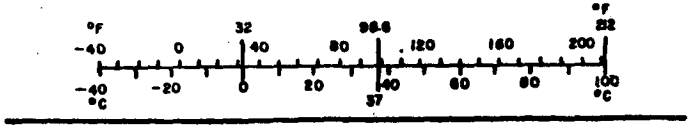
Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.96	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.



Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



FOREWORD

The success of the field test experiment described in this document required the assistance of a number of people involved with the California State and Los Angeles County governments whose participation is gratefully acknowledged. California Assemblyman (currently State Senator) Herschel Rosenthal and his staff were instrumental in introducing and ensuring passage of a legislative Bill that permitted the DDWS sanction to be administered to a number of convicted DWI (driving while intoxicated) drivers over a limited experimental period. Administration of the sanction also required the cooperation of the California Department of Motor Vehicles, and Bart Furtado was instrumental in setting up and administering the necessary procedures.

The California State Office of Traffic Safety was helpful in establishing many of the state government contacts required in getting this experimental program approved, and Marilyn Sabin was very helpful in setting up these contacts. The experiment would not have been possible without the cooperation of municipal court jurisdictions. Judges G. Tom Thompson of the Compton Court and Hiroshi Fujisaki from the West Los Angeles Court were instrumental in establishing cooperation with their courts and working with the experimental investigators in setting up procedures for selecting and assigning subjects and providing probationary monitoring. Also in the West Los Angeles Court Judges Roy Carstairs and Sherman Smith provided invaluable assistance in obtaining subjects. Ed Sachetti, the Public Health Officer at the West Los Angeles Court, also provided invaluable assistance in screening subjects for assignment to the DDWS (Drunk Driving Warning System) sanction under investigation on this project.

Roland Coleman, Esq., a member of the California state bar, provided invaluable assistance as a legal consultant in providing legal background and opinions on many issues. Drs. Thomas G. Ryan and Marvin M. Levy served as contract technical monitors during various stages of this project, and provided valuable editorial comments on the two volumes of this final report.

Finally, our appreciation to the publications staff at Systems Technology, Inc. who made the publication of this final report possible. Included are Winifred Reaber, Judy Wilbanks, Charles Reaber, and Jon Petitjean.

ADDENDUM

In some places, including the Executive Summary, the reader may be given the impression that a Drunk Driving Warning System (DDWS) must necessarily have as a component a Critical Tracking Task (CTT). It should be made clear that the DDWS is a system which incorporates a test device. In the study reported, the CTT was used as the test device. However, future DDWS units could be fabricated with different test devices.

This report covers some complex issues and methods. The conclusions reported in the abstract and Executive Summary should appropriately follow from the data analyzed and presented in the full report. In some instances, this connection does not appear to hold, i.e., the data do not appear to support the conclusion as stated. Although the conclusions may turn out to be correct, based on data yet to be collected, it is suggested to the reader that he/she examine the data presented to support the following conclusions before accepting them.

- " Thus, test failure would appear to significantly deter DWI trips."

  (This statement should correctly state "trips in the DDWS car.") It should be pointed out that test failures, as discussed above, were actually initial test failures. A person could take the test, fail it, and then retake it after a 10-minute wait. Test retakes could occur until a pass was achieved. In the report, initial failures are sometimes equated to a deterred trip.)

- " Significant early problems with the vehicles and DDWS equipment were encountered but overcome."

  (The DDWS cars were equipped with seat-weight sensors to help prevent substitution for the person who was supposed to take the test. This equipment did not function properly. Further work on this equipment component would be needed if the capability it provides is desired.)

- "Thus the current testing program is quite portable, and should be easily adaptable to court systems throughout the U.S. (Note: The current computer unit cannot tolerate extremely low temperatures ....)"

  (There have been other reports that the equipment is sensitive to high temperatures as well.)

- "Based on analysis of field test results and comparison with previous laboratory findings, the CTT/DDWS is shown to effectively detect driver impairment.... It is concluded that DDWS" - (meaning CTT) - "maintains good impaired driver discriminability in a field setting."

  (This conclusion was based on test failure rates of 35% at .10% BAC and 80% at .15% BAC and a procedure intended to infer BAC from DDWS scores in the field. The authors note that their conclusion depends on the validity of this procedure - see p. 72 and Appendix J. Technical questions have been raised about the validity of this procedure. NHTSA staff are performing additional analyses relevant to the issue of discriminability.)

In the course of performing some additional analyses using data provided in this report and raw data provided by the contractor, NHTSA staff found some apparent inconsistencies:

- A review of DDWS-car test records indicated that eight of the offender-subjects (rather than three as reported) drove the car with both alarms activated. A total of 13 such occasions were identified, rather than seven as reported.

- The total number of test failures as reported in Table 5, column 2, was not replicated by counting the number of failures on the computer event logs. The contractor reported a total of 351 (initial) test failures; there were a total of 447 such failures on the event logs.

- One subject who was reported to have had a number of deterred drives actually took the test again each time she failed until she finally passed. She was able to drive the car, typically, within 15-minutes after initial-test failure.

- In Appendix J, Table J-1, the sign after the lower-boundary values (i.e., for 0.05%, 0.10% and 0.15%) under the "BAC Range heading" should read "greater than" rather than "less than" to be consistent with their respective descriptions.

Although these corrections and cautions should be noted by the reader, they do not detract from some positive conclusions that can be drawn from information presented in the report:

- It is feasible to use the DDWS as an alternative sentencing sanction when sufficient cooperation can be obtained between state and local agencies.

- People are highly unlikely to drive a DDWS vehicle when the alarms are activated.

- It appeared that preventive measures incorporated in the system were sufficient to prevent tampering with the equipment.

Finally, the reader should be aware that NHTSA is preparing material that summarizes the status of DDWS work, including the results of this study, and other work aimed at improving discriminability through improved scoring techniques.

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EXECUTIVE SUMMARY

A. BACKGROUND AND OVERVIEW

This contract is part of a NHTSA program designed to investigate the feasibility of using in-vehicle performance tests for detecting and deterring impaired trips by drivers previously convicted of DWI offenses. The objective of this contract is to field test a specific device, the Drunk Driving Warning System (DDWS).

The DDWS is a vehicle-mounted device for testing driver impairment and activating alarms. The driver must pass a steering competency test, the Critical Tracking Task or CTT, before driving the car in a normal manner. The test must be passed in order to deactivate alarms consisting of the emergency flasher and horn. The car can be driven without passing the test but the emergency flashers will be activated, and above 10 mph the horn will honk at one-second intervals. Once the test is failed, the driver must wait 10 minutes before retesting is permitted. Various interlocks and other design features are included to deter the driver from circumventing the test and alarm system.

Previous laboratory research has shown performance on the Critical Tracking Task (CTT) to be sensitive to the effects of alcohol. If mounted on a car and employed as a DDWS, the past data suggest that the CTT might deter a large number of DWI trips, particularly in the case of high Blood Alcohol Concentrations (BAC > 0.15 percent). Based on these findings, a prototype CTT/DDWS was developed and installed on a late model car for the purpose of evaluation and demonstration. Based on successful vehicle implementation, 10 units were built for subsequent field evaluation which is the objective of this current contract.

The CTT/DDWS concept and hardware were developed under earlier contracts. The purpose of this work was to evaluate the feasibility of the concept, both in its sensitivity to alcohol impairment and in terms of various practical considerations in assigning the device to DWIs

(persons convicted of Driving While Intoxicated) as a judicial sanction in a probationary setting.

Volume I of the final report focuses on optimizing and validating the sensitivity of the CTT/DDWS to alcohol impairment. Background on CTT/DDWS development and mechanization is given, followed by reanalysis of past performance data and optimization of test parameters. The final system configuration was tested in a laboratory experiment. The discriminability of the test strategy to BAC (blood alcohol concentration) was confirmed. The ability of DDWS to discriminate impaired performance in a driving simulation was also demonstrated.

Based on the analysis, optimization, and experimental validation of CTT/DDWS performance, recommendations are given for test application and training procedures. These recommendations apply to the field test evaluation described in Volume II of this report.

Volume II of the final report describes the field test conducted to 1) test the performance of the CTT/DDWS in an operational setting, and 2) identify and solve the practical operational issues related to DDWS implementation through a municipal court system under various state laws and state agency operating procedures. Background is given on the pursuit of legal feasibility, and obtaining the support and/or cooperation of state and local agencies. Subject selection, processing, and assignment procedures are reviewed. Subject CTT/DDWS performance is analyzed and no inconsistencies are evident in comparison with the Volume I controlled laboratory results. Debriefing information and other project experience is summarized to address issues of user and public acceptance of the DDWS concept.

Based on analysis of field test results and comparison with previous laboratory findings, the CTT/DDWS is shown to effectively detect driver impairment. Implementation of the CTT/DDWS through a court system with assistance of state agencies is shown to be feasible. Future options for the current DDWS equipment and future developments are also discussed.

B. VOLUME I

The work reported in Volume I proceeded in two phases. First, data from past CTT laboratory experiments was reanalyzed to determine the BAC sensitivity of the CTT performance score, and to develop strategies for optimizing DDWS detection of impaired performance. The second phase was to conduct a laboratory study to validate test strategies and training procedures with a population of convicted DWI offenders.

1. CTT Data Analysis

Past CTT data from several previous laboratory experiments was reanalyzed in order to determine the underlying statistical properties of CTT performance and sensitivity to BAC. These results were next used to set pass/fail criteria in various multiple trial test strategies (e.g., passing one trial out of n attempts), which were applied to the data bases. The results of this reanalysis led to breakthroughs in achieving test optimization:

- Optimum multiple trial strategies were identified.
- Simple procedures were developed for setting individual pass score levels according to each driver's performance capability.
- Guidelines for training were determined, including procedures for estimating pass scores from training data.

Based on the results of the CTT data reanalysis, a validation experiment was planned and executed. The purpose of the experiment was to validate test discriminability with vehicle installed CTT/DDWS units, using procedures and optimal test configurations identified in the above analysis effort.

2. Validation Experiment

The experiment and subsequent data analysis addressed training methods, setting individual pass criteria, and selection of a test strategy (e.g., 4 attempts to achieve a single pass). Twenty-four

convicted DWIs were employed as subjects, and their CTT/DDWS performance was compared with their driving performance measured in an interactive car simulator.

Results showed that 35-40 percent of the subjects failed the test at 0.10 BAC (Blood Alcohol Concentration) depending on group differences and learning motivation. At 0.15 BAC the rejection rate inreased to 75-80 percent. Rejected subjects at 0.10 BAC and above were also shown to have impaired simulator performance compared to subjects passing the CTT test. Some motivation problems were encountered during subject training, which may have been due to the somewhat punitive nature of their participation (i.e., in lieu of a DWI fine). Training procedures were further modified to include time penalties for test failure. These procedures were subsequently tested on five subjects and found to yield well motivated learning over three training sessions.

Based on results of the above experiment, data analysis, and recommendation for the field test were developed as summarized in the Volume I report. Volume I also contains a complete description of the CTT/DDWS apparatus and operation, including anticircumvention features of the equipment and installation designed to prevent cheating.

C. VOLUME II

The work described in Volume II proceeded in three stages. First, legal constraints to the implementation of DDWS had to be resolved, and cooperation had to be obtained from courts and state agencies in the selection, processing and assignment of convicted DWI offenders. Next, the CTT/DDWS vehicles had to be prepared and field tested. Finally, the third phase involved planning and carrying out the field test evaluation, and reducing and analyzing resulting data.

1. Legal Feasibility and Cooperation

The purpose of this task was to resolve potential legal constraints to the implementation of the CTT/DDWS, and obtain the cooperation of courts and public and private agencies in this effort. A legal consultant was retained on the project to pursue specific legal issues. Legal

research by the consultant, and discussion with various California state agencies and local judicial district personnel did not uncover any legal constraints to the implementation of DDWS. A problem specific to California arose in the application of CTT/DDWS to repeat DWI offenders, however. Under state law, DWIs must enroll in a problem drinker treatment program for 1 year or lose their drivers license. Participation in a concurrent treatment program would confound the interpretation of DDWS effectiveness.

Through the cooperation of then Assemblyman (now State Senator) Herschel Rosenthal, enabling legislation was obtained to permit DDWS assignment to second time offenders.* A bill was subsequently passed by the California State Legislature (AB3482) which temporarily modified the vehicle code. Under this bill judges were allowed to assign DDWS as a sentencing option to a select population of 24 drivers through January 1, 1983. Previously available options were license restriction or participation in a year long state approved treatment program.

Judges in the West Los Angeles and Compton Municipal Court districts of Los Angeles County agreed to assign the CTT/DDWS as a sanction in drunk driving convictions. Detailed plans for selection, sentencing, and probationary monitoring of the subjects were worked out with the judges. Eligibility requirements were established to select subjects suitable for a DDWS sanction (e.g., financially responsible, regularly employed, need car for daily activities). Conditions of probation were also worked out that were consistent with normal court procedures and ensured responsible and exclusive use of a CTT/DDWS vehicle.

2. DDWS Installation and Pilot Testing

Eleven 1978 Novas provided by NHTSA, were instrumented with the CTT/DDWS system and thoroughly checked out in extensive pilot tests. Initially a series of problems were encountered with both the cars and

*Second time offenders were considered by NHTSA to provide a more stringent test of DDWS because their probability of a subsequent DWI offense is much higher than the single offender population.

installations. The cars supplied by NHTSA were secondhand and had experienced an appreciable amount of use before their involvement in this program. They initially required tires, batteries, and significant amounts of mechanical and tuneup work in order to meet safety requirements implied by the unusual liability problems associated with this program (i.e., drivers restricted under conditions of probation to driving a specifically assigned car).

The initial mechanical problems were overcome, but electrical system problems with both the cars and CTT/DDWS system were more persistent. Original features in the DDWS electrical and electronic design that made it sensitive to car electrical system problems were modified. These changes resulted in a significant increase in system reliability.

3. Field Test

Coordination went quite smoothly during field test startup. A variety of local enforcement agencies were briefed on the background and conduct of the study and the courts started subject selection when requested. The initial subject selection rate was low due to some misunderstanding of requirements. Subject assignment took longer than anticipated due to the various acceptance criteria, but a diverse subject population was ultimately achieved. The eleven subjects obtained from the West Los Angeles Municipal Court, and nine subjects assigned from the Compton Court represented a cross-section of racial, ethnic, and socioeconomic backgrounds.

Two subjects were subsequently dropped from the program. One subject had a third DWI arrest surface on his driving record (which occurred before his selection for this program), and a second subject seriously violated his conditions of probation. The remaining seventeen subjects successfully completed all requirements of the program. CTT/DDWS recorded data and debriefing information were analyzed, leading to the results and conclusions as discussed below.

4. Summary and Conclusions

a. Recorded Data

Recorded data was analyzed to look for DDWS influence on driving patterns, subject performance and the ability of DDWS to detect impaired drivers. Requiring the driver to take the CTT test with or without the DDWS alarms activated seemed to have little effect on day or night driving patterns. The relative amount of test passing and failing did not change significantly between week days and weekends, but did change rather dramatically with time of day. Day time failure rates were about what was expected (i.e., $\cong$ 2.5 percent) based on the procedure used to set individualized CTT pass scores. Nighttime failure rates were three to seven times greater than this level, however, and were consistent with laboratory discriminability results where BAC was controlled for and actually measured.

It is concluded that DDWS maintains good impaired driver discriminability in a field setting. As to whether subjects drive after test failure, in-depth analysis showed only three subjects drove with the alarms on (a violation of probation which is recorded by the DDWS data logger). One subject was determined to have driven while impaired, and even in this case there is some indication that the drive was made at low speed. Thus, test failure would appear to significantly deter DWI trips.

b. Project Experience and User Opinions

The courts and California Department of Motor Vehicles carried out their part in project support without serious problems. The courts do need an individual to take charge of subject screening, however, as was available through the West Los Angeles Municipal Court. Also, license restriction needs to be indicated on the front of the license to alert enforcement personnel and others (e.g., car rental agencies) of the restriction. California is currently investigating this feature and may provide it in the near future.

Public acceptability for the DDWS concept has been quite good, once the objectives, approach and background have been fairly presented. News media accounts of DDWS were fair and many times positive, although occasionally with some minor misinformation. Positive opinions have also been elicited by other individuals associated with the drunk driving problem, including relatives and colleagues of the DWI offenders employed here as subjects.

Finally, subject acceptance was quite good. No one found the DDWS to be a hardship, and most found it to be a desireable and effective sanction. Most subjects would choose DDWS as compared to fines, license restriction or suspension, or jail.

c. Reliability and Maintainability

Significant early problems with the vehicles and DDWS equipment were encountered, but overcome. Most of the serious problems were associated with the vehicle's charging system, car voltage variation sensitivity in the DDWS apparatus, and infant mortality problems in the data logger electronics. These problems were completely overcome, however, after completion of about the first third of the field test. Vehicle and CTT/DDWS sensors must be thoroughly checked. The steering wheel sensor on the current system required periodic replacement, and the vehicles battery/charging system must be kept up to factory specification.

The current equipment could be used again for several more subjects, providing that the vehicle electrical system and the DDWS steering wheel sensor are maintained. Most of the reliability and maintenance experience is irrelevant to new designs using state-of-the-art technology, however. New systems should be designed with a better, nonwearing steering sensor. The design should also take into account wide variations in vehicle battery/charging system voltage (i.e., 10-16 volts). These points are treated further below.

5. Future Options

a. Short Term Options (< 3 years)

Basically, the DDWS equipment is checked out and operational and procedures in place as described herein for subject selection, assignment and performance monitoring during the period of the DWI sanction. Further testing is possible with the current equipment in a program with similar procedures. The cars are approximately 5 years old and have gone about 30-40 thousand miles. They should be in good enough condition to run reliably for another two years. This would allow testing with perhaps four more subjects per car or an additional subject population of eighty. However, knowledgeable and experienced maintenance personnel would be required to maintain the vehicles and CTT/DDWS equipment.

The test plans described herein could be easily adapted for use in other court systems. The data reduction programs are in place on a NHTSA time sharing computer system, so they can be easily accessed with a remote terminal and telephone line coupler. Thus, the current testing program is quite portable, and should be easily adaptable to court systems throughout the U.S. (Note: The current computer unit cannot tolerate extremely low temperatures, and a heater modification should be considered for cold weather operation).

b. Midterm Options (3-5 Years)

The current CTT/DDWS equipment was designed almost a decade ago and the technology is out of date and obsolete by todays standards. If the CTT/DDWS concept is found viable then updated equipment design should be considered for future extensive testing. Current state-of-the-art technology would permit a much smaller and more self contained unit (i.e., smaller than a shoe box) with vastly improved capability including:

- Advanced micro processor to increase computational power. This would permit more sophisticated test strategies to increase discriminability and provide for some online data reduction.

- Solid state memory to replace the current digital cassette recording medium for recording usage data.

- Solid state display to replace the current electro mechanical meter.

The state-of-the-art design could be scaled for a modest size production run (e.g., 100 units) which would permit some economy in packaging and assembly. These units would be used in a setting where subjects provide their own car, and the reduced size should improve the installation effort. Procedures for providing the installation would have to be worked out, but would be comparable to installing a car stereo set.

As a mid-term option other scenarios should also be considered for DDWS application. Some possibilities include:

- Insurance company requirement for high risk drivers

- Voluntary installation to reduce insurance rates

- Routine installation in fleet vehicles (e.g., cabs, trucks, busses)

- A card key modification to permit multiple driver's with different pass criteria levels

- Roadside sobriety tester

- Installation to detect other types of driver impairment (e.g., drugs, fatigue, etc.)

- Voluntary installation for general impairment and improper driver detection

c. Long Term Option (> 5 Years)

Long term use of the DDWS countermeasure should consider volume production to minimize per unit cost, and means for simplifying vehicle installation. Production design modifications should be considered for large production runs (e.g., > 1000 units). Vehicle installation could

be simplified by encouraging vehicle manufacturers to provide a connector in the wiring loom where the DDWS unit could be conveniently plugged in (some vehicles already have a connector in steering column wiring loom which could be used directly for this purpose).

As a final long term option, alternate scenarios listed above that appear viable should be pursued.

SECTION I

INTRODUCTION

A. BACKGROUND AND OVERVIEW

This document reports on the pilot field test evaluation of the "Drunk Driving Warning System" (DDWS) concept and complements the laboratory results reported in Volume I (Allen, et al., 1982). Over the last decade National Highway Traffic Safety Administration (NHTSA) research and development personnel have been investigating the use of in-vehicle devices for deterring alcohol-impaired persons from driving. The DDWS concept includes a visual-motor behavioral test that is sensitive to alcohol impairment and is connected to an alarm system. Passing the test permits the car to be driven in a normal manner. If the test is failed or not taken and the car is driven, the vehicle's emergency flashers are actuated, and above 10 miles per hour the horn honks once per second.

This project, performed under NHTSA Contract DOT-HS-8-02052, was conceived to test the feasibility of applying the DDWS concept in a judicial setting in which a person convicted of a second Driving While Intoxicated (DWI) offense is afforded the alternative of driving a vehicle equipped with the DDWS, rather then undergoing more common sanctions such as license suspension, jail, etc. The program was structured to investigate judicial implementation procedures, and DDWS reliability and effectiveness in deterring drunk driving trips. Volume I of this report reviewed laboratory research on the development and optimization of the behavioral test called the Critical Tracking Task (CTT), and gave a complete description of the DDWS apparatus and operation. This second volume describes the judicial implementation of the DDWS sanction, field test performance results, and user and public acceptance of the DDWS concept.

B. SUMMARY OF VOLUME I REPORT

Work reported in Volume I was preliminary to the actual field test implementation discussed herein, and was generally intended to optimize the capability of CTT/DDWS to discriminate between drunk and sober drivers. An extensive amount of prior work was reviewed on the CTT, the behavioral test employed in the DDWS. The statistical properties of CTT performance and alcohol sensitivity were reanalyzed in order to derive a statistical model that would allow optimizing CTT discriminability of drunk drivers.

CTT performance test strategies and test parameters were optimized, and a laboratory test was performed to validate the recommended test configuration. The ability of CTT to discriminate against driver BAC was also compared with independent measures of subject behavioral impairment obtained in a driving simulator.

Recommendations for optimum CTT/DDWS test parameters and subject training procedures are included in Volume I. A test strategy requiring one success in four attempts is recommended, and procedures are specified for setting the test pass level criterion. The amount of training and specific training techniques are also specified. Means for updating the pass level to counter long term learning is also addressed. Finally a complete description of the DDWS apparatus and operation is given.

C. OBJECTIVES OF THE FIELD TEST EVALUATION

The overall objective of the field test evaluation was to investigate the practicality, public acceptability and effectiveness of DDWS when used with convicted drunk drivers. More specifically, the objectives of the work reported herein were to

1) identify a suitable site for pilot testing the DDWS concept;

2) develop judicial and other (i.e., administrative) procedures for subject selection and assignment of the DDWS as a DWI sanction;

3) obtain objective performance based data on the effectiveness of CTT/DDWS in reducing alcohol impaired trips of persons convicted of Driving While Intoxicated (DWI);

4) obtain interview data from relevant sources (subjects, judges, etc.) on the feasibility and acceptability of the DDWS concept as use in a judicial setting.

D. VOLUME II REPORT OUTLINE

Section II of this report reviews the legal and administrative aspects of deploying the DDWS under California state law, and implementation of this sanction through the Los Angeles County Municipal Courts. This effort required working with several state government executive branch agencies as well as the state legislature. Details of important legal opinions and special legislation are given in Appendices A and B.

Section III presents the approach and methods used in the pilot field test, including vehicle preparation and pilot testing, subject selection and assignment, experimental design and procedures, and data reduction and analysis. Municipal court judges worked closely with project personnel in establishing guidelines for subject selection and processing, and the details are included in Appendices D, E, and F. The details on data collection and analysis procedures are given in Appendix G.

Section IV discusses the results of the pilot field test, including analysis of recorded performance data, a summary of operational reliability data, and results on interview data obtained from subjects, court personnel, and others. More detailed results on subject interviews and individual performance, including case histories can be found in Appendices H and I.

Section V contains a discussion of the major results and conclusions of the field evaluation portion of this project, and addresses specific issues raised by NHTSA regarding the feasibility and practicality of the DDWS concept.

SECTION II

LEGAL FEASIBILITY AND COOPERATION

A. BACKGROUND

The legal feasibility of implementing the Drunk Driving Warning System (DDWS) on the road has been a major consideration since the inception of the DDWS concept. As part of a previous research effort, NHTSA contracted with the Highway Safety Research Institute (HSRI) to investigate and analyze the legal issues, and obtain expert interpretation on the use of a DDWS in an on the road setting (Greyson, et al., 1978). This nationally oriented study delineated various DDWS employment scenarios; discussed the constitutional and statutory issues involved in both voluntary and mandatory use; discussed issues involving both normal and malfunctioning operation of the system; and summarized the potential constraints which could result in prevention of DDWS implementation. Greyson concluded that viable techniques were available to resolve any of the legal barriers to an operational DDWS.

The legal feasibility and cooperation concerns were also a major concern of this project. Because this project was viewed as a feasibility study, obtaining cooperation from agencies and individuals, and overcoming legal constraints represented one of the stepping stones to showing that implementation of a DDWS is, in fact, feasible. Had we not been successful in this, the project results would have been quite different. Rather than showing a positive and hopeful result, we would have been forced to conclude that the DDWS sanction was not feasible.

B. NATIONWIDE REVIEW

The HSRI study (Greyson, et al., 1978) identified a number of legal concerns that might be faced when implementing the DDWS sanction. These concerns were grouped into four categories: 1) deployment of the DDWS; 2) constitutional and statutory issues; 3) driver licensing issues; and 4) DDWS equipment issues.

Deployment issues centered around who the DDWS user would be. The report suggested four groups of potential users, and discussed how the DDWS sanction might be employed with each group. One of the groups was voluntary users (i.e., users who install and use a DDWS, but who have no legal requirement to do so). Other users would be required to install and use a DDWS, either by court order or legislative action, as a result of a drunk driving conviction. These groups include users involved in a pre-trial diversion program; use of DDWS to avoid delays in license suspension/revocation hearings; and use as a sentencing sanction. The HSRI report also discussed potential implementation problems, and some possible solutions, with indigent users, one car family users, and non-vehicle owner users.

The constitutional and statutory issues discussed were concerned with legal authority to impose DDWS; probationary terms; the possibility that DDWS might be challenged as cruel and unusual punishment; the reasonableness of the DDWS sanction; and whether the DDWS might restrict a persons right to free travel.

Driver licensing issues were concerned primarily with the ability of the licensing authority to restrict a drivers license to use of a DDWS equipped vehicle. Equipment concerns included the legality of flashing the vehicle's emergency lights; and the possibility of the honking horn violating noise ordinances.

Generally, the Greyson (1978) report indicated that while there would probably be legal constraints to actual DDWS implementation, there exist methods which can address these constraints, and thus allow legal use of the DDWS.

C. STATE AND LOCAL ISSUES

Because the current DDWS project was concerned with a local research application of the DDWS, and did not take the National perspective of the HSRI study, we faced problems other than those envisioned by Greyson, and had no problems with some of those the report mentioned. Public acceptability became one of the key feasibility issues. Major opposition to the DDWS concept at any step might have jeopardized the

implementation feasibility. Several interest groups became involved in generating public acceptability.

The first group was the judiciary. Because this program was designed to test the DDWS feasibility with convicted drunk drivers, the Courts necessarily became involved. Judges were first contacted to determine any possible misgivings about the system at the proposal stage of this project. At that time, and throughout the project, positive responses were generally received. There were one or two judges who felt that the DDWS concept should be used in conjunction with treatment (which would have confounded test results on this project), but even in these cases the general feeling was: "I'll use any and all tools in my power to try to reduce the drunk driving problem."

The second interest group, attorneys, are also involved in the legal system. Defense Attorneys looked upon the DDWS as an additional sentencing possibility for their client. While some were concerned mainly with their clients getting the best break, and viewed DDWS in this light; most were seriously concerned with both their client's best interest and with the best interest of society as a whole, and indicated that they felt this sanction would hopefully keep their clients from engaging in further drunk driving episodes. We had several defense attorneys contact us on a regular basis to track their client's progress. This was certainly above and beyond the call of duty as their client's cases were disposed and they had other work to attend to.

Prosecuting Attorneys had little say about this DDWS implementation because they were not involved in the subject selection for the project. They could, however, have impact in the future. Again, we found little objection, and a great deal of support for the DDWS concept in general, and for this project in particular.

Because of the decision to use convicted second offenders from California (discussed in Article E), various state agencies, as well as the California Legislature, became involved in, and supported the project. Should the DDWS be implemented on a national basis in the future, the various state legislatures and agencies will play a key role. DDWS enabling legislation will need to be enacted, and legislators rely

heavily on the views of various state agencies affected by laws they enact.

The final group that has the potential to "make or break" the DDWS concept is the general public. As NHTSA is aware, a group of citizens can alter the course traffic safety programs quite rapidly. This was the case when the population mobilized against the seat belt interlock system of the mid-70's. Fortunately, the citizen's wrath is now directed at drunk drivers. Initial public resistance to the project was encountered because some members of the media conveyed the project as a frivolous and lenient sanction, which was echoed by "vocal" members of the general population. They viewed the project cost as excessive, and were quite irate that convicted drunk drivers were to be given cars to drive. (Government vehicles were used as replacement transportation in these tests, and subjects were required to pay for gas, oil, insurance, and maintenance. When implemented in a non-research setting, it is expected that the DDWS will be paid for by the user and installed in his or her own vehicle.)

Under the direction of the Contract Technical Manager, information was disseminated to the news media at their request. Also, a few educational presentations were given to Citizen's and Safety Groups at their request. The results were dramatic. Once the misconceptions were corrected, the public has supported the project and endorsed the system. The press initially called the DDWS a "Drunkmobile." The name was catchy, and gave the public some indication of what the vehicle does. The most recent news coverage came after the system was mentioned during testimony before the President's Commission on Drunk Driving. In her report, Kirsty Wilde of KABC-TV (the Los Angeles ABC affiliate) stated that the DDWS should not be called a "Drunkmobile," but rather an "Anti-Drunkmobile!"

D. SITE IDENTIFICATION

Selecting a location for conducting the field tests was a joint effort between Systems Technology, Inc. (STI) and NHTSA. No location was ideal. Sites in close proximity to STI had the disadvantages of

dealing with current California laws and large judicial systems. At the time California law required the Department of Motor Vehicles to suspend for one year the drivers license of anyone convicted of a second offense of driving while intoxicated. This action was stayed if the person registered for, attended, and successfully completed one year of treatment at an approved program. Judicial intervention could not prevent the suspension if the defendant was convicted and the treatment conditions were not met.

Other possible sites suggested by NHTSA included Texas and Pennsylvania. Pennsylvania had the disadvantages of extreme winter conditions, leading to questionnable reliability of the prototype equipment; while both sites had a distance factor adding travel cost to the contract. The judge in Pennsylvania who had contacted NHTSA at the inception of the project was no longer hearing DWI cases, and was not interested in helping any longer.

For logistic and cost reasons it was decided that we first pursue the project in the Los Angeles area. There were several advantages to the area which led to the decision.

- The close proximity to STI meant that no extended travel would be required.
- The relatively benign weather would place no undue demands on the equipment.
- There was a large population of drunk drivers from which to obtain our sample.
- California has uniform drunk driving laws, and mandatory sentencing procedures. Thus, our subjects were likely to be representative of the DWI offenders throughout the state.

E. USER IDENTIFICATION AND SELECTION

Probably no task was revised more in the course of the project than the identification and selection of subjects for the field tests. A number of possible alternatives were considered, including administrative sanctions; plea bargaining methods; post-conviction; pre-sentencing techniques; and use of the DDWS as a sentencing tool after conviction.

After a great deal of discussion, it was decided that the subjects should come from a judicial setting, rather than use administrative sanctions through the Department of Motor Vehicles (DMV).

Assemblyman Herschel Rosenthal (our legislative contact) sent letters to several judges in the Los Angeles area describing the program, and soliciting support. We were contacted immediately by two of the judges, and both indicated a willingness to help. Prior to utilization of the DDWS as a sentencing tool, the Los Angeles County Council was contacted to insure that the County would not be placing itself in a libelous situation. (His opinion is found in Appendix A.)

Contact was made with the California Department of Motor Vehicles to determine how STI should proceed in order to restrict the subjects' drivers licenses to use of the DDWS vehicle only. DMV indicated that they needed legislative authority to restrict the subject's drivers license to use of the DDWS vehicle only; however, they pointed out a section of the vehicle code that allowed the judge to suspend the subject's drivers license and then reinstate it on a restricted basis.

A decision needed to be made about whether our subject population would come from first or multiple DWI offenders. As mentioned earlier, California has uniform sentencing procedures for DWI offenders (a synopsis of current and past California sentencing guidelines is found in Table 1). Because of these procedures, using first time offenders would make DDWS sentencing easier, but it would add to the sentence that the offender could customarily expect to receive. Using multiple offenders presented more of a legal problem, as we did not wish to confound our results by having the subject in treatment while the DDWS sanction was in force. However, second and subsequent offenders could expect stiffer penalties than first offenders; and they are more likely to continue their drinking/driving behavior than many first offenders. For these reasons it was decided that the project should use multiple offenders. Because California Law, under Senate Bill 38, required that second and subsequent offenders attend and complete an approved alcohol treatment program for one year in order to keep their drivers license, or receive a one year license suspension, a problem was created.

TABLE 1. SYNOPSIS OF CURRENT AND PAST CALIFORNIA SENTENCING GUIDELINES

	1st OFFENSE (With Probation)		2nd OFFENSE (With Probation)			
			NO TREATMENT		WITH TREATMENT	
	Until 12-31-81	Beginning 1-1-82	Until 12-31-81	Beginning 1-1-82	Until 12-31-82	Beginning 1-1-82
Fine	$275-500*	$375-500	$275-1,000	$375-1,000	$275-1,000	$375-1,000
Jail	48 hours*	48 hours - or - license restriction below	2 days	10 days minimum	None	2 days minimum
Driver's License Action	None	90 day restriction (work only) - or - jail above	1 year suspension	1 year revocation	None	1 year restriction (work and treatment only)
Treatment					1 year successful participation	

*If the person participates in an 8 hour alcohol awareness program the fine is reduced to $150-500 and the jail sentence is suspended.

A post-conviction - pre- sentencing scheme was arrived at that allowed STI to get around the law. The defendant would plead guilty to the DWI offense. The judge would accept the plea and take it under advisement. The defendant would be ordered to participate in the DDWS experiments, and upon successful completion of the six-month testing, would return to court. The judge would then decide whether an additional six months of treatment would be required. Once successful completion of either DDWS, or DDWS plus treatment occurred, the original plea would be refused and the defendant would be allowed to plead guilty to the lesser charge of reckless driving.

This scenario obtained initial approval from all involved parties. Subsequently, though, NHTSA had second thoughts; and for a very good reason. They felt that this scenario provided a great reward for successful completion of the DDWS program. After all, many people would be willing to do almost anything to keep a DWI off their driving record. It was decided that the project should be conducted with the DDWS sanction as one sentencing alternative; but the guilty plea must remain. It was felt that a legislative Concurrent Resolution would be sufficient to allow multiple offenders to be sentenced to the DDWS sanction without the need to reduce the charge.

Once a Concurrent Resolution was drafted, both STI and NHTSA representatives traveled to Sacramento to meet with various state agencies who would be asked to comment on the resolution. In Sacramento, however, it became apparent that the Concurrent Resolution would not prevent DMV from suspending the defendants driving privilege. The only way that DMV would be allowed to forego suspension was by Legislative direction in a law; Concurrent Resolutions are not laws. Therefore, the decision was made to change from introduction of a Resolution to introduction of a Bill.

The Bill was introduced by Assemblyman Herschel Rosenthal in the California Legislature on June 2, 1980, and the Legislature recessed on July 11, 1980 (see Appendix B for full details on the legislation). During this time period STI personnel met with concerned Agencies to consider amendments to the Bill if there were any objections; pass the

Bill in the Assembly Criminal Justice Committee and on the Assembly floor; send the Bill to the Senate; and have it assigned to and passed by the appropriate Senate Committee. Luckily it was possible to wait until the recess ended to have the Bill passed in the Senate and returned to the Assembly for any possible amendment concurrence.

Several State Agencies supported the Bill and offered their help. The Office of Traffic Safety helped organize an information campaign for the various agencies. Support was received from the Alcohol Beverage Control Board and from DMV. Some initial opposition was received from the Department of Alcohol and Drug Projects (DADP), however.

Initial test plans called for validating the alcohol impairment detection ability of the DDWS by bringing in the subjects' for controlled laboratory sessions where they would drink and perform the DDWS task. DADP took strong objection to giving alcohol to multiple offenders, who by the virtue of their offense, already had an alcohol problem. A compromise was achieved by designing a separate laboratory experiment to validate the DDWS detection ability which utilized current first offenders. This was DADP's only objection to the program. They agreed that the validation experiments were necessary, and that use of current first offenders was acceptable. As DADP felt that the DDWS sanction could prove successful in preventing drinking driving, and in the future could become a helpful adjunct to treatment, once their objection was addressed they became strong advocates.

A minor problem was also raised by the California Highway Patrol (CHP). Because the DDWS vehicles were equipped with non-approved equipment, the vehicle code required the CHP to issue an experimental vehicle operating permit. In addition, there was questionnable legality with flashing the hazard lights and honking the horn. CHP felt they might be left open for a liability suit if they issued an experimental vehicle permit, and were reluctant to do so. At their request the Bill was ammended to exempt the vehicles from needing the permit and allowing them to flash the hazard lights and honk the horn.

The Bill was ammended several times. Copies of the Bill in it's various forms are found in Appendix B. The Bill's first committee

hearing was in the Assembly Criminal Justice Committee, and heard just prior to a highly publicized Anti-Rape Bill. Because of this the Committee chambers were packed with reporters. The DDWS Bill attracted a great deal of attention and generated numerous press interviews. Copies of the newspaper and magazine articles concerning the project are found in Appendix C.

Unfortunately, passage of the Bill did not end legislative problems. 1981 was an active year for Anti-Drunk Driving Legislation throughout the country, and California led the pack. Comprehensive sentencing reform was enacted, and it appeared that effective January 1, 1982. STI might no longer be able to obtain subjects. As shown in Table 1, the new law called for a one year mandatory restriction of an individuals drivers license concurrent with treatment. In the eyes of the law the DDWS research was an alternative to treatment, and there was some question as to the effect of the proposed legislation on future DDWS subjects. Project personnel again went to Sacramento, this time to discuss the problem with the new Bill's author. The discussions were fruitful, resulting in a specific exemption of any part of the new law for DDWS participants. (This Bill is also found in Appendix B.)

F. LEGAL CONSULTING

Due to the legal complexities of the project, we retained Roland L. Coleman, Esq. as the projects' legal consultant. Mr. Coleman brought to the project a diverse background in transportation law. He was present during the discussions with the judges; he assisted in the preparation of all legal documents used in the project, as well as reviewed work plans dealing with court obtained subjects; and he was present at NHTSA briefings and meetings with various state agencies. He was also called upon to investigate various questions and render legal opinions. Copies of his legal opinions are found in Appendix A.

SECTION III

FIELD TEST METHODS AND PREPARATION

A. OVERVIEW

This section comprises a summary of the approach and procedures employed in conducting a pilot field test of the Drunk Driving Warning System (DDWS). A description of the system and its operation have previously been given in detail in Volume I of this report (Allen, et al., 1982). Here we discuss the preparation (Subsection B) and pilot testing (Subsection C) of the vehicles in order to provide a safe and reliable vehicle for assignment to convicted DWI (Driving While Intoxicated) offenders. Field test procedures are discussed in Subsection C, including subject selection and processing and experimental design and procedures. Further details on test design and procedures are documented in Appendices D-F. Finally, data collection and analysis procedures are reviewed in Subsection D with detailed information contained in Appendix G.

B. VEHICLE PREPARATION

Vehicle preparation involved checkout and repair of the vehicles themselves, and installation of the DDWS electronics. Used vehicles were provided as GFE (Government Furnished Equipment) to this project, and every precaution was taken to ensure that vehicle condition would not present a safety hazard to the subjects who would subsequently be assigned these vehicles as a DWI sanction. The DDWS installation and operation have been described in Volume I of this report (Allen, et al., 1982). Details on these activities were as follows.

1. Vehicle Checkout and Repair

The DDWS system was originally designed to be installed in 1975 Chevrolet Novas. This contract was awarded in late 1978, the last year of Nova production. In order to minimize subsequent installation effort snd vehicle cost, a fleet of used Novas were provided by the government

for use on the project. Several steps were required in order to prepare the cars for use on the DDWS project:

- Safety check and repair of safety related problems.
- Tuneup and inspection to meet California Air Quality Standards (the cars were brought in from out of state).
- A white paint job in order to minimize heat build-up in the DDWS electronics on hot days.

As stated above the primary objective during checkout and repair of the vehicles was to provide safe and reliable transportation for DWI subjects. All of the cars required new tires and batteries, and several needed brake jobs. The front ends were aligned, and two cars required additional work on their steering systems. All the cars required major tuneups and subsequent adjustments in order to run smoothly and not pause or die during critical maneuvers.

All cars were given a thorough safety check by an independent mechanic and major problems were repaired at that time. Some diagnosis and repair work was also handled by an Authorized Chevrolet Agency. Tuneup problems persisted, however, and were resolved over a period of time by a project technician. Problems were also encountered with the battery charging system. While important from a driving reliability point of view, charging system operation was also critical to the operation of the DDWS system. This issue will be discussed further under pilot testing.

2. DDWS Installation and Checkout

The DDWS electronics were originally built on a previous contract (Peters, 1977) and provided by NHTSA for use on this project. Installation details have previously been documented (Peters, Jex, and Fifer, 1975) and a complete system description is given in Volume I of this report. The DDWS units used on this project were limited production prototypes that were built for NHTSA then stored for several years. Aside from one test unit, none had been used in a real world environment.

The overall objective of the system installation and checkout effort was two fold:

- to ensure reliable DDWS operation.
- to provide for a tamper proof installation to prevent subjects from circumventing intended DDWS operation.

Installation basically involved the following steps.

- Mount the driver's DDWS display assembly on the steering column (Fig. 1).
- Install DDWS electronics module and data logger in the trunk (Fig. 2).
- Electrical hookup of the DDWS alarm circuit to the vehicle emergency flashers and horn.
- Installation and electrical connection of seat sensors to indicate driver presence and weight.
- Connect DDWS power cable to car battery.
- Seal various electrical and mechanical connections to prevent subjects from tampering with desired DDWS function.

The installation effort also included two system modifications. The first involved upgrading the DDWS power supplies so the system could function over a wider temperature range. The design for this upgrade had been accomplished on a previous project (Peters, 1977), and involved replacement of a printed circuit card. The second modification was more extensive and required the design and construction of a strain gage system for checking subject weight. The objective of this subsystem was to provide a means for subject identification. Further details on this system are given in Volume I of this report.

As installation and checkout proceeded, several operational problems arose that required further system modification and repair. After some period of operation it was found that the characteristics of the vehicle charging system had significant effect on system operation. High voltage would cause failures in the DDWS data logger electronics, while low voltage would lead to unreliable data logging. Circuit modifications

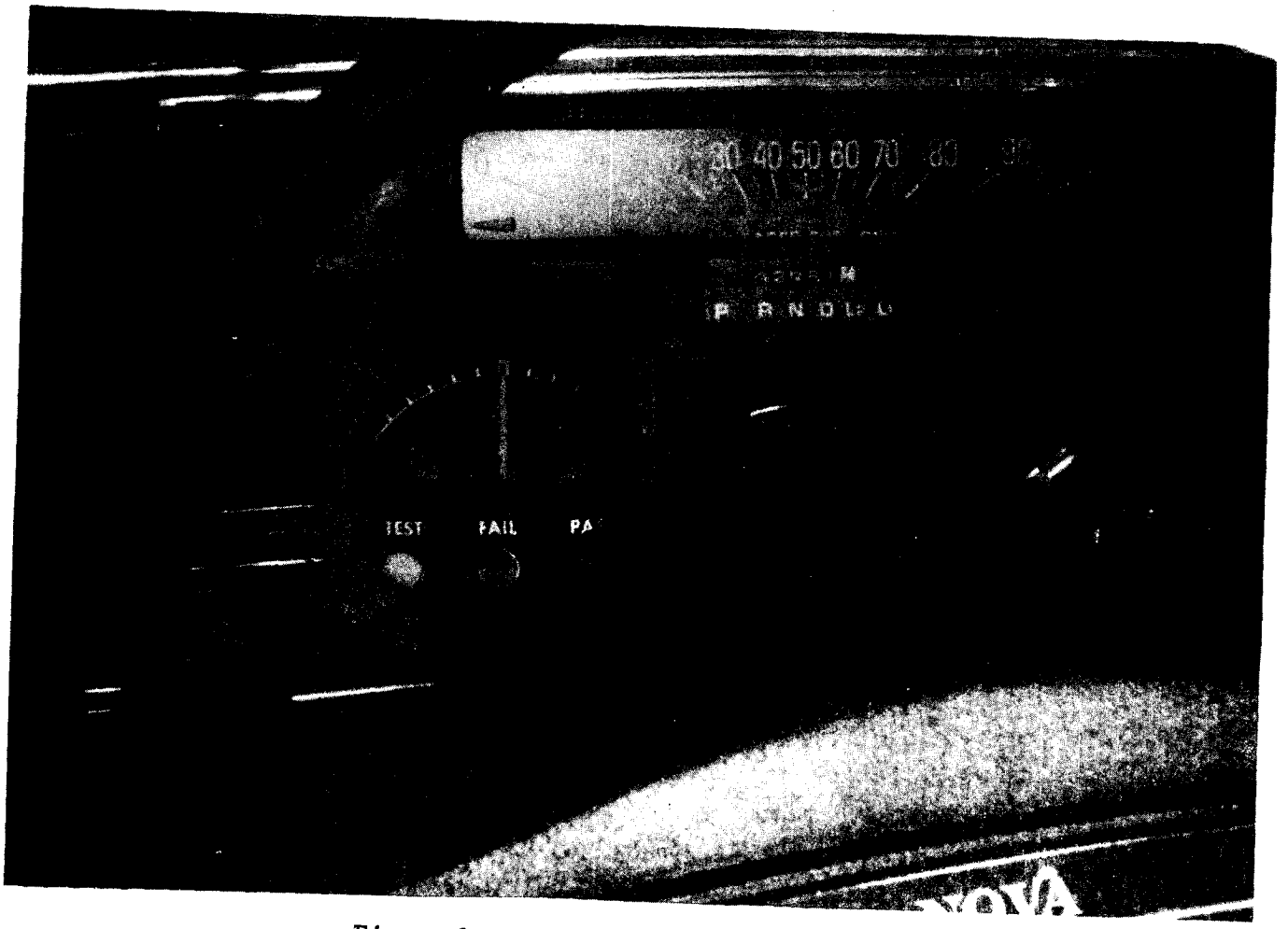

Figure 1. Dash Mounted CTT Meter

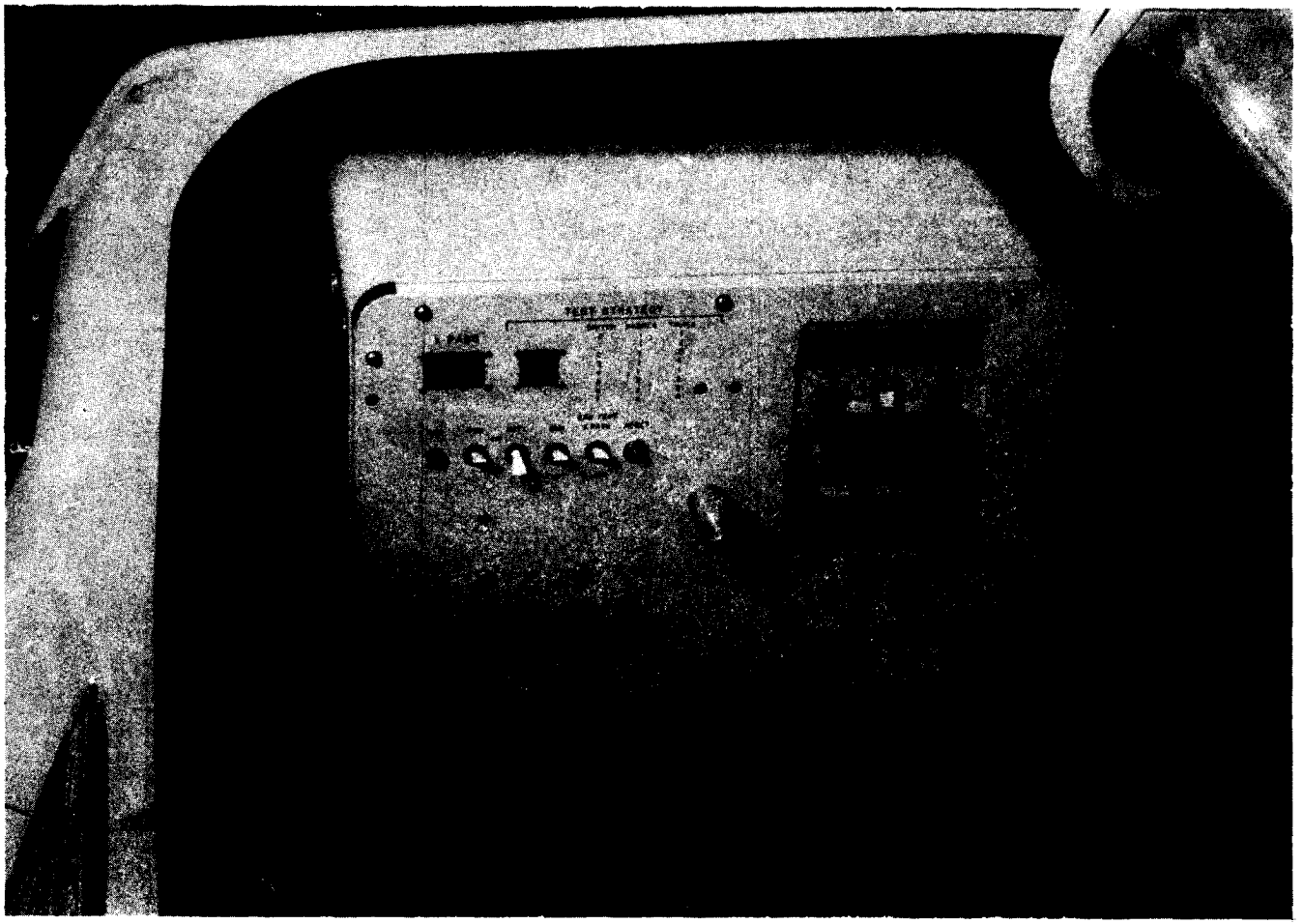

Figure 2. Trunk Mounted Electronics Module and Data Logger

were made to protect against high voltage problems. Low voltage problems were overcome by ensuring that the charging system (including both the alternator and regulator) was operating according to factory specifications. Charging system problems persisted throughout pilot and early field testing as will be discussed subsequently.

Problems also occurred in the display meter. The indicater needles had warped during storage and some were dragging against the meter face causing erratic performance. Also the needle suspensions were loose on several units. The meters were all sent back to the manufacturer for repair and adjustment in order to avoid any further problems. Since the DDWS units had been stored for several years before their use on this project, and it is possible that storage conditions aggravated some of the meter problems.

A final problem was encountered with the data logger electronics. During checkout, random failures were experienced in various "chips" (integrated circuit components). The charging system high voltage problem discussed above was originally thought to be the sole problem. The circuit failures persisted after the voltage problems were solved, however, and were subsequently attributed to "infant mortality" in a batch of components which were not environmentally tested. Isolated failures persisted through pilot testing and early field testing until all weak components had failed and been replaced.

Some of the above detail may seem irrelevant to the overall objectives of the field test. This experience is relevant to the issue of system reliability, however, and whether the current units have any further useful service life. Also there are implications for designing future systems to operate reliably in the automotive environment. These issues will be discussed further in the next subsection on vehicle pilot testing, and will be reviewed and summarized in the results section when the overall questions of DDWS reliability and maintenance requirements are discussed.

As each of the vehicle installations was completed, preliminary checks were made to verify correct system operation. This included both

system functioning and data recording. When the system installation passed a set of preliminary checks, they were then assigned to an STI employee for more extensive pilot testing as discussed below.

C. DDWS PILOT TESTING

The purpose of the pilot testing was to provide a thorough checkout of each of the DDWS-equipped vehicles prior to releasing them to court assigned DWI subjects. Each vehicle was subjected to several weeks of routine daily driving to check for any malfunctions in system operation or data logging. This testing, performed by the project team and other STI staff members, included checks on various aspects of system functioning:

- Proper operation of the seat and door interlocks.
- Proper operation of the CTT task.
- Smooth operation of the display meters.
- Correct operation of the system after a test failure by the driver.
- Proper alarm activation.
- Continuous operation of the vehicle and task in day-to-day operation.
- Correct logging of data on the tape.

Each operator kept a daily log that included: date; time of day; pass or fail on CTT test; number of trials; alarm activation; and any additional relevant comments.

As discussed previously, several problems persisted in the pilot testing. Problems with vehicle driveability were a key concern. Stalling and hesitation during acceleration were felt to be critical safety problems. These problems were slowly corrected through timing and carburetor adjustments and other tuneup type repairs. Vehicle electrical charging system problems also persisted. It is possible that the DDWS placed an additional load on the charging system which caused weak or marginal alternators and voltage regulators to further deteriorate and

fail. Marginal charging systems were mainly a problem in terms of reliable data logging, however, they also resulted in DDWS malfunctions and dead batteries.

Failure of data logger electronic components continued during the pilot test. Also, a steering potentiometer, used to sense steering wheel position during CTT testing, developed a dead spot and was replaced. Pilot testing was continued on vehicles which had experienced component failures to ensure that all problems had been corrected. Vehicles were approved for assignment to DWI subjects when it was felt that they performed safely and the DDWS and data logging system operated reliably. As will be discussed subsequently, some charging system and data logger problems persisted in the early phases of the field test but were ultimately corrected.

D. FIELD TEST

As discussed previously in Section II, judges from two municipal courts in Los Angeles County were enthusiastic about the DDWS program. They agreed to work with us in setting up procedures and in offering the DDWS sanction to selected convicted DWIs. Various procedures were worked out in concert with the judges, and the California Department of Motor Vehicles (DMV), to handle subject selection, processing, and deployment in the program including:

- Court eligibility criteria for offering the DDWS as an alternative sanction.
- STI screening procedures.
- Court/STI assignment procedures for accepted subjects.
- License restriction, insurance coverage, and vehicle assignment.
- Training.
- Biweekly check-ins to review activities and conditions of probation.
- Final structured debriefings to determine DDWS user acceptability

Detailed information on methods and procedures for the above issues can be found in Appendices D-F. A summary of this information follows.

1. Subject Acquisition

Twenty licensed drivers were obtained through the West Los Angeles and Compton Municipal Courts as they were being processed for their second violation of Section 23102(a)* of the California State Vehicle Code. The courts used the following criteria to determine which drivers to refer to STI for further screening.

- Arrested for DWI and entering a guilty plea.
- Had a prior DWI conviction within the last five years.
- Lived in the L.A. area or routinely came to L.A.
- Had a continuing need for a car.
- Socially responsible.
- Interested in DDWS program based on a brief description by the judge or the Public Health Officer.

Defendants passing the judicial selection procedures then contacted STI for further screening.

At STI the applicants were given an in-depth description of the DDWS program with special emphasis on the probationary conditions and STI's rules for participation. A psychological test (Hathaway and McKinley, 1970.) was administered to screen out those individuals having personality profiles that indicated tendencies toward aggression under alcohol or severe emotional problems. If the MMPI profile was within normal range the subject was interviewed and a brief drug use history was taken. These interviews helped to eliminate applicants who might be likely to tamper with the equipment or ignore the probationary

*23102(a). "It is unlawful for any person who is under the influence of intoxicating liquor, or under the combined influence of intoxicating liquor and any drug, to drive a vehicle upon any highway."

conditions. The interview, in conjunction with the MMPI profile and drug use history screened out individuals who were chronic alcoholics or drug abusers. Any defendant who did not meet STI criteria, was returned to the court for normal processing. Defendants who met the criteria were asked if they wished to volunteer for the DDWS project. If so, they returned to court where the terms of probation were imposed thus officially assigning them to the DDWS program.

As a practical matter, screening was handled differently in the two courts. West Los Angeles used a Public Health Officer to screen all subjects and recommend alternatives to the judges. The Public Health Officer (PHO) was willing to consider the DDWS sanction under the basic criteria given above, but emphasized the California treatment program (periodic group counseling over a one year period) as a more desirable alternative. The PHO claimed that about 50 percent of the DWIs offered the DDWS sanction accepted it.

The Compton Municipal Court did not have a Public Health Officer, so judges had to do their own screening. After three initial referrals, one of whom was finally assigned a DDWS vehicle, no further referrals were received until a follow-up contact was made by STI personnel when it was time to select the second group of ten subjects. At that time it was becoming clear that it was difficult for the judges to carry out the screening process. As the end date approached when DWIs could be assigned DDWS under the special California legislation (Appendix B), it was apparent that several additional subjects would be needed from the Compton Court (eleven subjects had already been obtained from West Los Angeles). At this point, STI personnel went to the court and worked with the court clerk in screening subjects to obtain the remainder of the subject population.

2. Subject Processing and Assignment

Because there were ten DDWS equipped cars available, the 20 subjects had to be acquired in two groups. This situation was further aggravated by not having all ten cars checked out and passed through pilot testing at the same time. Subject selection was somewhat slowed down by court

procedures as discussed above, however, and to a certain extent the vehicle checkout was able to keep pace with the rate of court referral. As the scheduling worked out, there were never more than nine cars assigned at any given time. The tenth car was used as a spare, which provided a much needed backup several times as vehicle and/or DDWS problems required the use of a temporary substitute vehicle.

The subjects had to complete three processing steps before the car was assigned:

- Court imposition of probation.
- License restriction at a local DMV office.
- Insurance acquisition.

The conditions of probation imposed by the judge are included in Exhibit 2 of Appendix E. Condition No. 4 of Exhibit 2 states that the subject is to obey all rules and conditions of STI in conjunction with the research project. The rules and conditions of STI are included in Exhibit 4 of Appendix E. After the subjects were placed on probation they went to the Inglewood Driver Improvement Division of the California Department of Motor Vehicles and had their license restricted. This restriction allowed the subject to drive only the DDWS vehicle and was in effect for a period of 6 months. After license restriction and verification of insurance, the DDWS vehicle was assigned.

3. Experimental Design and Procedures

The design and procedures are presented in detail in Appendices D-F. In the basic experimental design each subject experienced three project phases as illustrated in Fig. 3. Phase 1 provided for orientation and training, during which the DDWS alarms were turned off, but the data logger was recording baseline driving patterns. During Phase 2 the DDWS alarms were active. Finally, in Phase 3 the alarms were again turned off to see if any change in driving pattern would occur. Procedures for the three phases were as follows:

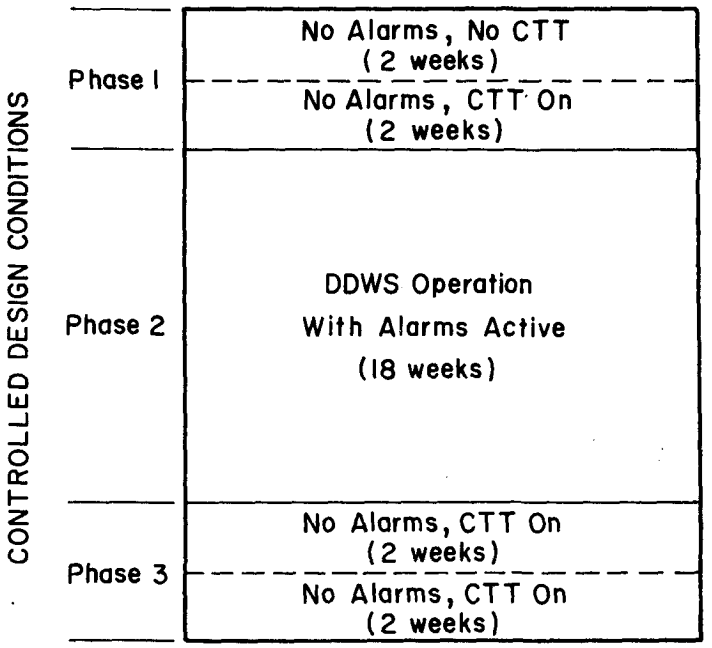

Figure 3. Field Test Experimental Design

a. Phase 1 (4 weeks)

Baseline driving behavior was determined during the first 2 weeks. The test equipment was set so that the test was automatically passed when the subject pressed the test start button mounted on the steering column. The logger was activated and all trips were recorded on the data logger. During this period the subject familiarized himself with the car, learned to press the test button before driving and logged each trip in a log book. The subject was required to log each trip for the entire 6 month period and the baseline phase provided the opportunity to get used to logging without worrying about the test or the alarms (a complete description of DDWS apparatus and operation is given in Volume I of this report).

CTT training took place during the second 2 weeks of Phase 1 and consisted of: 1) supervised formal sessions and 2) unsupervised training during normal everyday driving. Training details are discussed in Appendix F, and training procedures are discussed in more depth in Volume I of this report.

Formal training sessions occurred at the beginning, the mid-point, and the end of the 2 week training period. Between sessions the subject took the test prior to each trip in the car which provided additional training. The subjects' individualized pass scores were set based on analyzing the cumulative distribution of their CTT scores. This approach is discussed in Appendix G, and the background for this technique is covered in Volume I of this report. The data obtained from the final training session was analyzed and the pass criterion was set. At this point the alarms were turned on and the experimental phase began.

b. Phase 2 (18 weeks)

Subjects were required to come to STI every other week for a check-in that lasted approximately one hour. While the subject stayed in a waiting room, their data logger tape was removed from the car and read into a computer for analysis as discussed in Appendix G. The data logger in the car recorded four different events with day, hour, and minutes for each event. The 4 events were: 1) ignition on, 2) ignition off, 3) CTT test scores, and 4) driving over 10 mph without passing the test.

The computer data reduction program used to reduce biweekly check-in data generated four outputs as discussed in Appendix G. The first was a cumulative distribution of scores over all the test trials during the 2 week period. This plot was quickly assessed by the experimenter to determine if a new pass criterion was in order due to learning. The second computer output was test scores plotted according to the hour of the day for the 2 week period. The third output was an event log. This log showed the driving behavior for the 2 week period. The events were broken out into different columns so that test failures and trips with alarms on were immediately apparent. The final output was a trip report. This arranged the components of each usage -- ignition on to ignition off -- into categories for further analysis. For detailed descriptions of these and other outputs see Appendix G.

After data had been reduced and evaluated at the biweekly check-in sessions the subjects were debriefed. First they were asked about any

unusual events on the computer generated event log, or discrepancies between their log book entries and the event log. For this they usually had to refer to their log book. Next, the biweekly check-in debriefing form in Appendix F was completed. Any questions or problems were discussed at this time.

The final part of the biweekly check-in was a quick vehicle inspection. Again, the biweekly check-in form was used. All DDWS seals were checked. Tires, water, battery, and oil were checked. Any problems were brought to the attention of the subject with instructions to have it taken care of before the next check-in, i.e., add a quart of oil or have air put in the tires. A quick routine test of the machinery was also carried out. This was to verify that 4 fails did trigger the 10 minute wait period, opening the door and getting off the seat did in fact recycle the test, etc. The hazard lights flashed until the test was passed so it was always apparent that they worked. However, to verify that the horn would actually come on, the subject was requested to drive the car down an alley without passing the test.

At the end of the biweekly check-in a clean tape was installed in the data logger, and the DDWS electronics box was locked and sealed.

c. Phase 3 (4 weeks)

The 3rd phase of the experiment included the last four weeks that the driver had the car. During the first 2 weeks of Phase 3 the subject drove the car with the DDWS test operating but with the alarms deactivated. This was to determine if CTT feedback alone is sufficient to maintain behavior changes that might have taken place during Phase 2, and to see if the subject's driving patterns reverted to those observed during Phase 1. (Subjects were aware that the alarms had been turned off.) On the other hand if there is a carryover effect we should have seen a continuation of the Phase 2 driving patterns. We also looked for instances of driving after failing the test, or a change in vehicle use patterns. During the final two weeks of the subjects' participation in the project the DDWS system was completely deactivated, with the data logger still recording all trips with day, time, and hour. If the

system caused a change in driving patterns, and this shift had no carry-over effect, a change in vehicle use patterns was expected.

At the end of the 26 week period the subject turned in the car and received a letter to take back to court. This letter indicated that the subjects' participation in the DDWS project was complete and satisfactory. Once it was clear to the subject that he or she had successfully complete the program we asked the questions contained in the User's Debriefing in Appendix G, Exhibit 1. We asked the subjects to be completely candid and assured them the responses would be confidential and used only for STI's purposes.

E. DATA COLLECTION AND ANALYSIS

Three classes of data were collected during the field evaluation phase of the DDWS program as summarized in Table 2. The first class concerns data associated with each subject's biweekly check-in sessions. As discussed previously, during the biweekly check-ins recorded data on vehicle use and test activity was read off the data logger cassette tapes. The subject's log book entries were also available, and debriefing data was generated at the end of each check-in session. The second data class includes information obtained in structured debriefings. Each subject was debriefed at the conclusion of their six month probation. The opinions of court personnel and other individuals were also solicited in structured debriefings. The third class of data on system reliability was obtained randomly throughout the period of vehicle pilot testing and during biweekly check-ins.

The biweekly check-ins provided the focus for the major amount of available data. As discussed previously in Subsection C and elaborated in Appendix G, data logger information was read into a computer system for preliminary reduction and analysis. This process created data formats discussed in Appendix G that gave the experimenter feedback on the time and date of episodes involving test failures and or driving the vehicle with alarms activated. The experimenter could then check these data logger recorder episodes with the subject's hand written log book, and question the subject about them during the debriefing at the end of the session.

TABLE 2. FIELD TEST DATA SUMMARY

Biweekly Check-in Data

- Objective performance data (CTT scores, test failures, number of attempts to pass, etc.) from the data logger digitally recorded cassette tapes
- Subject recorded data from the hand written log books
- Debriefing data concerning test failure episodes and general experience over biweekly period

Structured Debriefings

- Subjects, relatives, and friends
- Court personnel
- Miscellaneous (individuals with some connection to the DDWS program or the general drunk driving problem)

DDWS Reliability Data

- Pilot vehicle test experience obtained by members of the STI staff
- Information reported by subjects at biweekly check-ins during DDWS assignment
- Other recorded episodes of vehicle or DDWS failures noted during biweekly check-in data reduction

The above process led to more in-depth data on whether recorded failure episodes were due to equipment failures, were legitimate sober failures, or could be construed as impairment related test failures which led to either a deterred or undeterred (alarms on) drive. This class of in-depth data analysis provides additonal valuable insight into the circumstances surrounding recorded failure episodes, but also contains a certain element of subjectiveness. The criteria used for the in-depth analysis are discussed further in Appendix H.

Reduced data from the biweekly check-ins were stored in computer files for further analysis at the conclusion of the field test. Data analysis was performed on the trip report files (described in Appendix G) using the UCLA "P" series statistical analysis program package (Dixon, 1981). Frequency counts and histograms of trips, test passes, and failures were obtained as a function of experimental phase, time of day, and test score. These data were then further reduced by hand to give inferred CTT discriminability curves.

SECTION IV

FIELD TEST RESULTS

A. OVERVIEW

The results are derived from three basic data sources:

- Data recorded by the DDWS data logger which was retrieved and reviewed at biweekly check-ins for each subject
- In-depth assessments developed during review of biweekly check-in recorded data, subjects' hand-written log books, and subject debriefing on test failures, and other events during the previous two weeks
- Structured interview data obtained from subjects, colleagues and relatives of subjects, court and state agency personnel associated with the program, and others associated with the general drunk driving problem.

One objective of recorded data analysis was to look at the effects of DDWS operation on subject driving patterns, as discussed below in Article B. A second objective was to analyze test performance, as reviewed in Article C, which includes interpretations based on inferred subject BAC (blood alcohol concentration) derived from test performance scores. More detailed information on each subject's individual test performance is included in Appendix I. The method for estimating driver BAC from test scores is discussed in Appendix J.

During each subject's biweekly check-in session the experimenter was able to compare computer analyzed recorded data with subject log book entries, and question drivers about specific episodes. Discussion of this "in-depth" analysis of subject performance is given in Article D.

In Article E, user and public acceptance of the DDWS sanction is examined. Comments obtained in structured debriefings from various sources are examined and compared. Additional detail and summary of individual subject's comments is also contained in Appendix H. Finally, in Article F, experience on equipment reliability and maintainability is reviewed.

B. DRIVING PATTERNS

One of the basic issues to be resolved is whether having to take the CTT test and having the alarms activated affect the subjects driving pattern, e.g., driving less when the alarms are activated. In order to address this issue, the DDWS data base was analyzed using the BMDP4F program (Dixon, 1981) for generating multiway frequency tables. Pass and fail counts across all subjects are broken down according to key experimental variables in Table 3. Time of day and weekday vs. weekend were added to the formal design variables described in Section III in order to look for trends during common drinking periods (i.e., nights and weekends). In order to obtain direct comparison between conditions involving the activation of the CTT task and DDWS alarms, the first and last three biweekly check-in periods were analyzed.

In Fig. 4 frequency data are plotted for various alarms on and alarms off biweekly periods in the experimental design. It would appear that there were more weekday driving trips during the first biweekly period than at any other time. This could be attributed to a novelty effect. It is also possible that activating the CTT test suppressed driving, although considering both day and night periods acrossed all check-in periods does not consistently support this latter explanation. Otherwise there are not any consistent trends apparent.

A Chi-squared statistical analysis of the Table 3 data was performed. In order to include pass vs. fail as a variable, the 1st and 13th biweekly check-in data was excluded because the subjects did not take the test during these check-in periods. The analysis results are given in Table 4. All main effects show reliable differences. When we consider interactions with the pass/fail variable "F" however, note that the interactions including the weekday/weekend variables "W" (i.e., FW, FTW) do not suggest reliable differences. This suggests that the relative differences between passing and failing do not vary significantly by day of the week, even when considering the data as a function of time-of-day ("T"). Because of this result, and to simplify further analysis, data breakdowns according to weekday/weekend were dropped from further consideration.

TABLE 3. FREQUENCY COUNTS OF TEST PASSES AND FAILURES FOR VARIOUS EXPERIMENTAL DESIGN CONDITIONS

Alarms Off ; CTT Off

Biweekly Check-in No. 1

		PASS	FAIL	
WKDAY	12T04A	30	0 I	30
	4T08A	138	0 I	138
	8T012N	307	0 I	307
	12T04PM	174	0 I	174
	4T08P	132	0 I	132
	8T012M	45	0 I	45
	TOTAL	826	0 I	826
WKEND	12T04A	16	0 I	16
	4T08A	23	0 I	23
	8T012N	104	0 I	104
	12T04PM	87	0 I	87
	4T08P	66	0 I	66
	8T012M	24	0 I	24
	TOTAL	320	0 I	320

Biweekly Check-in No. 13

		PASS	FAIL	
WKDAY	12T04A	24	0 I	24
	4T08A	129	0 I	129
	8T012N	187	0 I	187
	12T04PM	158	0 I	158
	4T08P	144	0 I	144
	8T012M	59	0 I	59
	TOTAL	701	0 I	701
WKEND	12T04A	12	0 I	12
	4T08A	28	0 I	28
	8T012N	69	0 I	69
	12T04PM	129	0 I	129
	4T08P	90	0 I	90
	8T012M	23	0 I	23
	TOTAL	351	0 I	351

Alarms Off ; CTT On

Biweekly Check-in No. 2

		PASS	FAIL	
WKDAY	12T04A	15	5 I	20
	4T08A	129	8 I	137
	8T012N	158	5 I	163
	12T04PM	170	4 I	174
	4T08P	169	11 I	180
	8T012M	32	4 I	36
	TOTAL	673	37 I	710
WKEND	12T04A	11	0 I	11
	4T08A	34	0 I	34
	8T012N	83	0 I	83
	12T04PM	110	0 I	110
	4T08P	85	4 I	89
	8T012M	26	4 I	30
	TOTAL	349	8 I	357

Biweekly Check-in No. 12

		PASS	FAIL	
WKDAY	12T04A	41	4 I	45
	4T08A	136	10 I	146
	8T012N	146	7 I	153
	12T04PM	172	2 I	174
	4T08P	129	3 I	132
	8T012M	59	5 I	64
	TOTAL	683	31 I	714
WKEND	12T04A	13	4 I	17
	4T08A	25	2 I	27
	8T012N	59	1 I	60
	12T04PM	71	5 I	76
	4T08P	74	6 I	80
	8T012M	38	0 I	38
	TOTAL	280	18 I	298

Alarms On ; CTT On

Biweekly Check-in No. 3

		PASS	FAIL	
WKDAY	12T04A	14	4 I	18
	4T08A	128	5 I	133
	8T012N	163	8 I	171
	12T04PM	155	2 I	157
	4T08P	116	14 I	130
	8T012M	60	9 I	69
	TOTAL	636	42 I	678
WKEND	12T04A	13	4 I	17
	4T08A	31	1 I	32
	8T012N	69	4 I	73
	12T04PM	114	4 I	118
	4T08P	85	12 I	97
	8T012M	25	2 I	27
	TOTAL	337	27 I	364

Biweekly Check-in No. 11

		PASS	FAIL	
WKDAY	12T04A	11	3 I	14
	4T08A	140	0 I	140
	8T012N	157	5 I	162
	12T04PM	159	4 I	163
	4T08P	132	5 I	137
	8T012M	40	0 I	40
	TOTAL	639	17 I	656
WKEND	12T04A	9	1 I	10
	4T08A	22	1 I	23
	8T012N	69	1 I	70
	12T04PM	92	3 I	95
	4T08P	68	0 I	68
	8T012M	21	1 I	22
	TOTAL	281	7 I	288

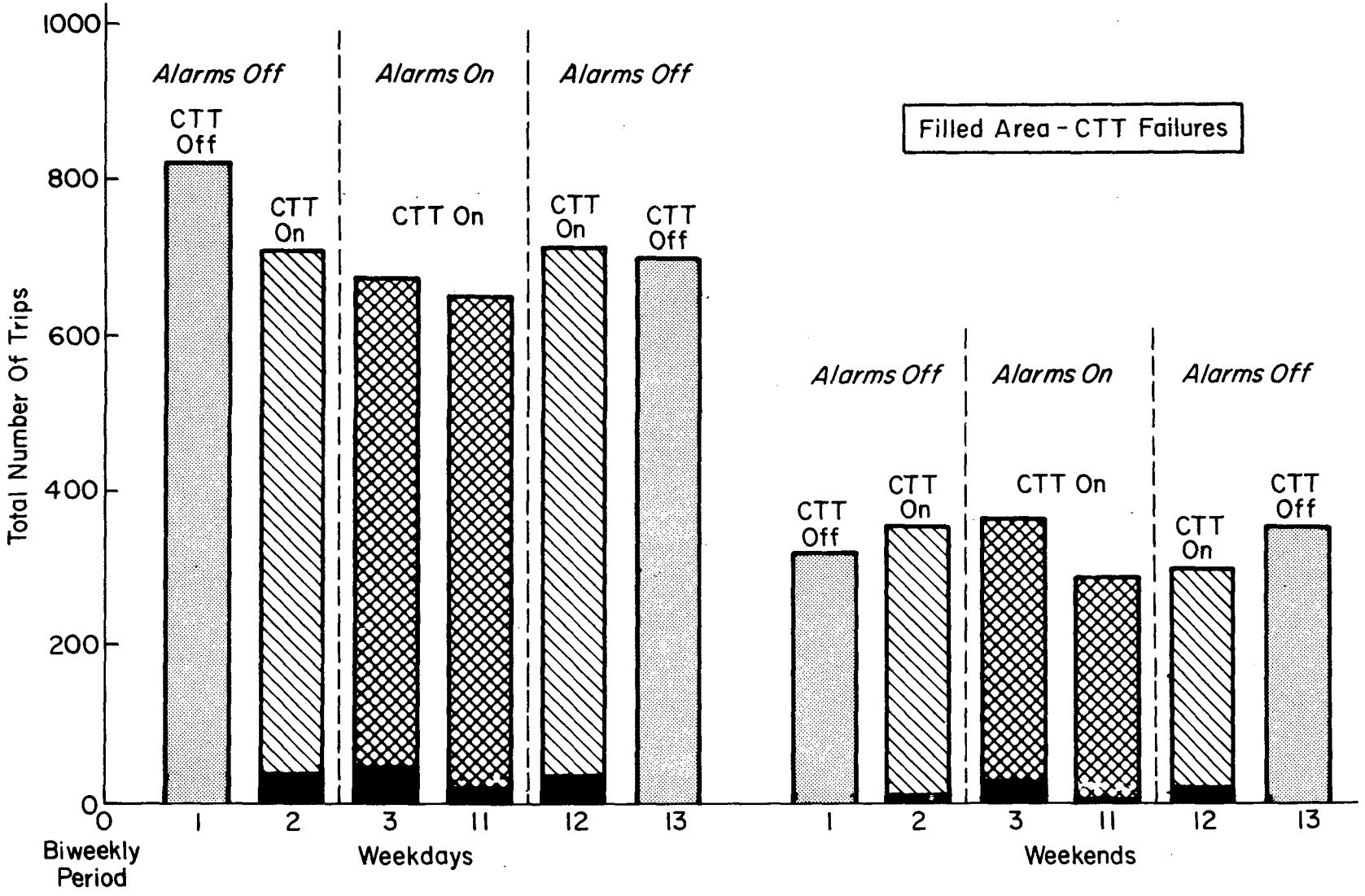

Figure 4. Effects of Alarms and CTT Test on Driving Frequency

TABLE 4. CHI-SQUARE ANALYSIS OF TABLE 3
FREQUENCY COUNTS

EXPERIMENTAL EFFECT	DEGREES OF FREEDOM	CHI-SQUARE	TYPE I ERROR PROBABILITY
Fail/Pass - F	1	4118.44	0.0
Time of Day - T	5	1174.14	0.0
Weekday/Weekend - W	1	529.53	0.0
Biweekly Check-in - B	3	8.42	0.0380
FT.	5	58.87	0.0000
FW.	1	0.12	0.7342
FB.	3	18.13	0.0004
TW.	5	101.24	0.0
TB.	15	41.60	0.0003
WB.	3	8.64	0.0345
FTW.	5	4.94	0.4230
FTB.	15	27.67	0.0237
FWB.	3	8.90	0.0307
TWB.	15	21.41	0.1241
FTWB.	15	33.60	0.0039

According to Table 4, the frequency count interaction between time of day and biweekly check-in period (i.e., TB) was statistically significant. In Fig. 5 alarms off (Biweekly periods 2, 12) and alarms on (Biweekly period 3, 11) have been plotted according to time of day. Except for the time period 8:00 a.m. to 12:00 noon, it would appear that the number of trips is slightly less when the alarms are active. This result does not appear to be of serious practical significance, however.

A final point to note from Table 4 is that, aside from various non-significant "W" interactions, the Biweekly check-in variable "B" exhibits the least significant effect, which is also apparent from

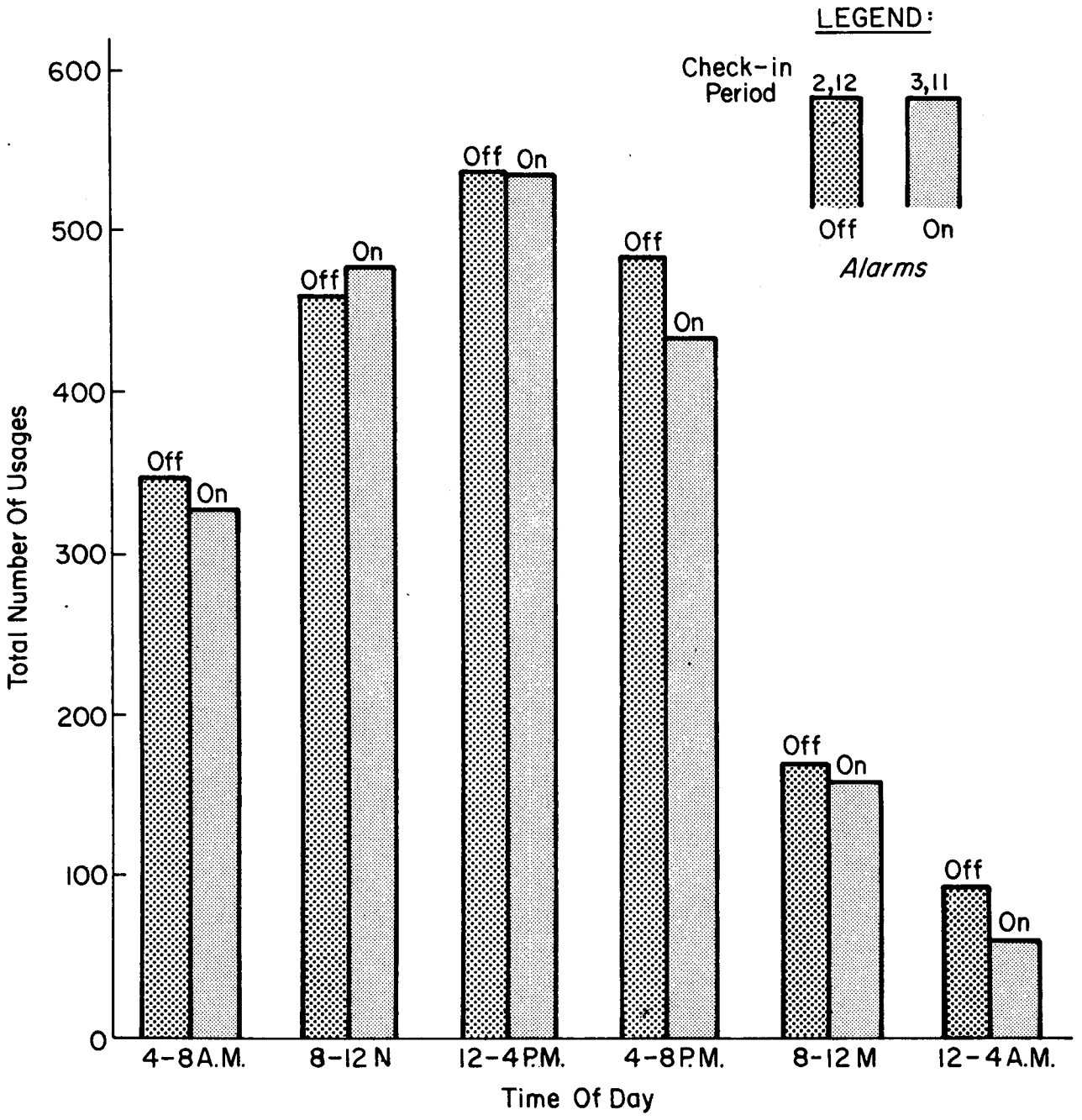

Figure 5. Effects of Alarms on Driving Frequency as a Function of Time of Day

Fig. 4. Based on this observation and the other results above the variables of concern for further analysis were restricted to time of day, and pass/fail.

C. TASK PERFORMANCE

The field test data were analyzed to determine the distribution of test passes and failures as a function of time of day and the average differential test score (i.e., average test score for all trials minus the pass level). The average differential test score was computed over all trials for a given pass or fail. Note that test failure always implies four test scores, while a pass may involve one to four trials for the one pass out of four trials test strategy used here. Differential test score relative to the pass level was chosen as the independent variable because the purpose of the individualized pass level for each subject is to minimize between subject differences in test performance. Also, validated models from the Volume I work allow us to infer equivalent BAC's (Blood Alcohol Concentrations) from differential test scores as will be discussed further on.

Pass and fail distributions as a function of differential test scores for morning, afternoon and evening time periods are illustrated in Fig. 6. The data were accumulated across subjects and biweekly test period when available. Some data were lost for individual subjects as indicated in Appendix I. Subject No. 14 was excluded from this analysis because of his unusual behavior in routinely failing his first trial with very low scores (this response pattern is discussed in detail in Appendix I). This response pattern created a large number of passing trials at low scores which created a bi-model distortion in the pass distribution.

The most failures in Fig. 6 occur in the 4:00 to 8:00 p.m. time slot, while the most passes occur in the 12:00 noon to 4:00 p.m. slot. However, if we consider the percentage of failures per overall number of trips as plotted in Fig. 7, we see that failure rate increases quite dramatically beyond late afternoon. Note also that the day time failure rates are quite consistent with the 2.5 percent sober failure rate that

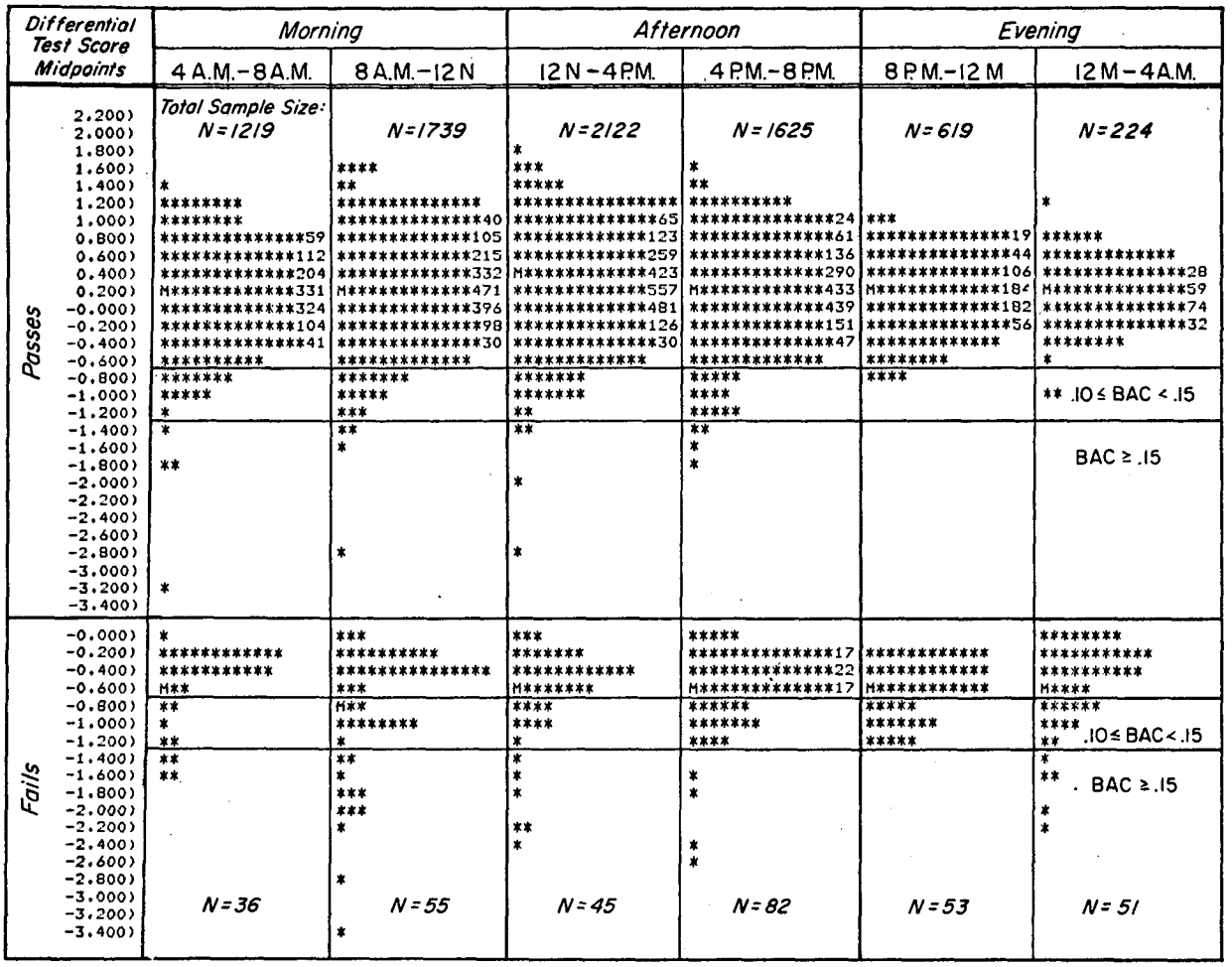

Figure 6. Pass and Fail Distribution for Various Time Periods Across All Subjects and Biweekly Periods 3-11. "M" Denotes Mean. Distribution Counts Above 16 Indicated by Numbers. Data for Subject 16 Excluded Due to Unusual Behavior Discussed in Appendix I. Differential Test Score Averaged Across Number of Test Attempts (4 for a Fail, <4 for a Pass). Estimated BAC Ranges Correspond to 90 Percent Confidence Bounds as Derived in Appendix J

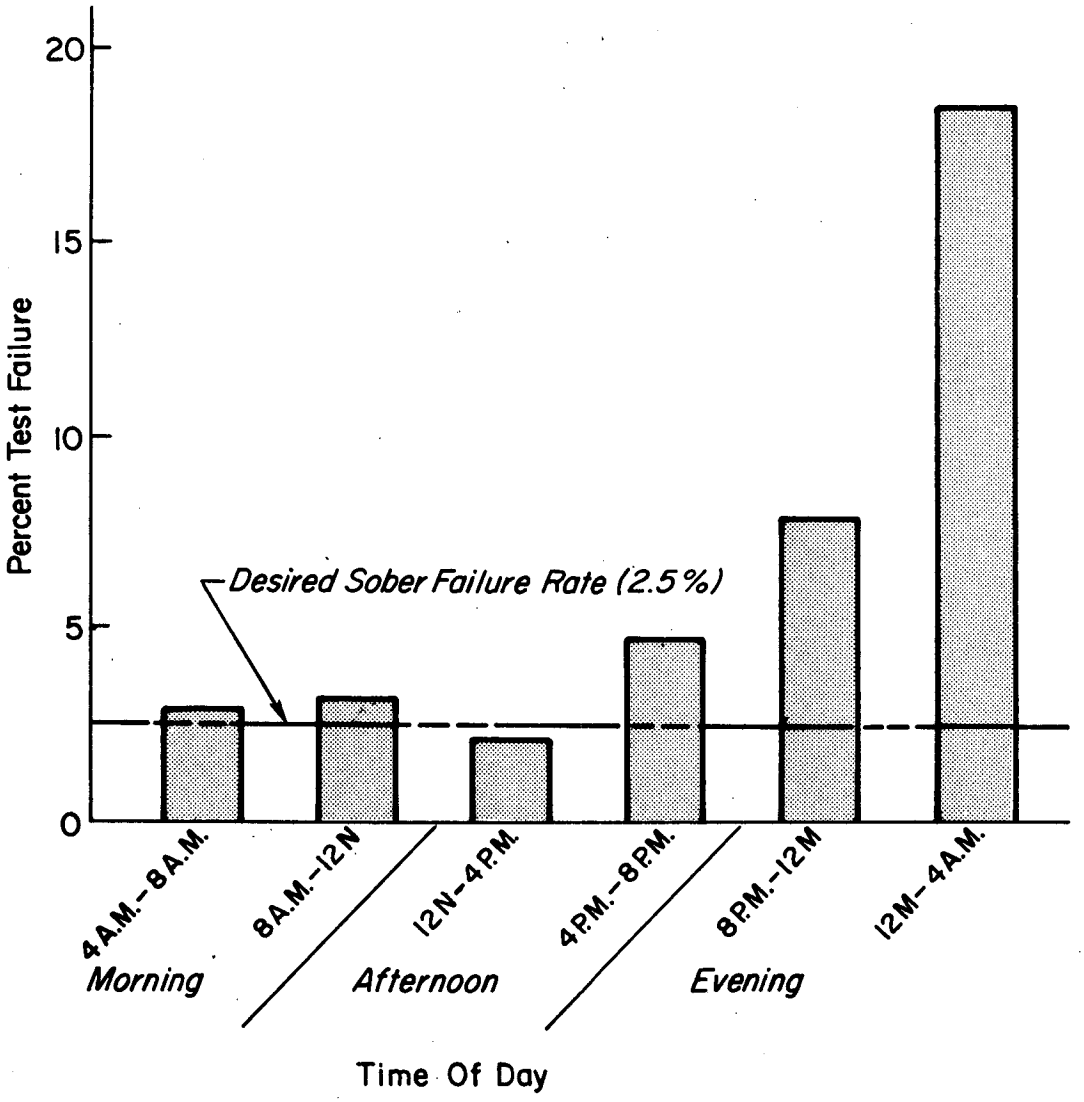

Figure 7. Failure Rate as a Function of Time of Day. Test Failure Percentage Computed from Figure 6 Data For Each Four Hour Time Block: Percentage Test Failure = 100 × No. Fails/(No. Fails + No. Passes)

we attempted to achieve with the procedures validated in Volume I for setting individualized pass levels.

BAC ranges for differential test score intervals are indicated in Fig. 6. The BAC range estimates represent 90 percent confidence bounds which are derived in Appendix J and are based on laboratory data analyzed in Volume I of this report. Strictly speaking, the ranges are only appropriate when the differential test score is averaged across four test attempts. This is always true for the test failures, and could occur when the test is passed on the fourth trial. In the evening it is apparent that there are a high proportion of test failures at low test scores associated with high BAC's.

The Fig. 6 data were further processed in order to get test discriminability curves (i.e., failure percentage as a function of differential test score). Time blocks were combined to give three time periods. The time blocks were chosen to roughly correspond to morning and afternoon job commuting periods, and evening social activities, with the evening representing a period of well known high drinking driver exposure. The day was subdivided into only three time blocks for this analysis in order to accumulate adequate data for each of the conditions.

Failure percentages (number of failures divided by total failures plus passes) were then computed for each differential score in each time period. The data are plotted in Fig. 8. Here we see an interesting dichotomy. Night failure rates are higher for given differential scores than day time rates. This most likely represents a higher proportion of drinking involved drivers at night. The 90 percent confidence bounds for BAC ranges derived in Appendix J are also indicated in Fig. 8. It is encouraging to note that a large percentage of the low test scores at night resulted in test failures.

Care must be taken in deriving test discriminability interpretations from the above data. Since BAC data are not available, BAC ranges corresponding to differential test score intervals were estimated using a conservative 90 percent confidency boundary as discussed in Appendix J.

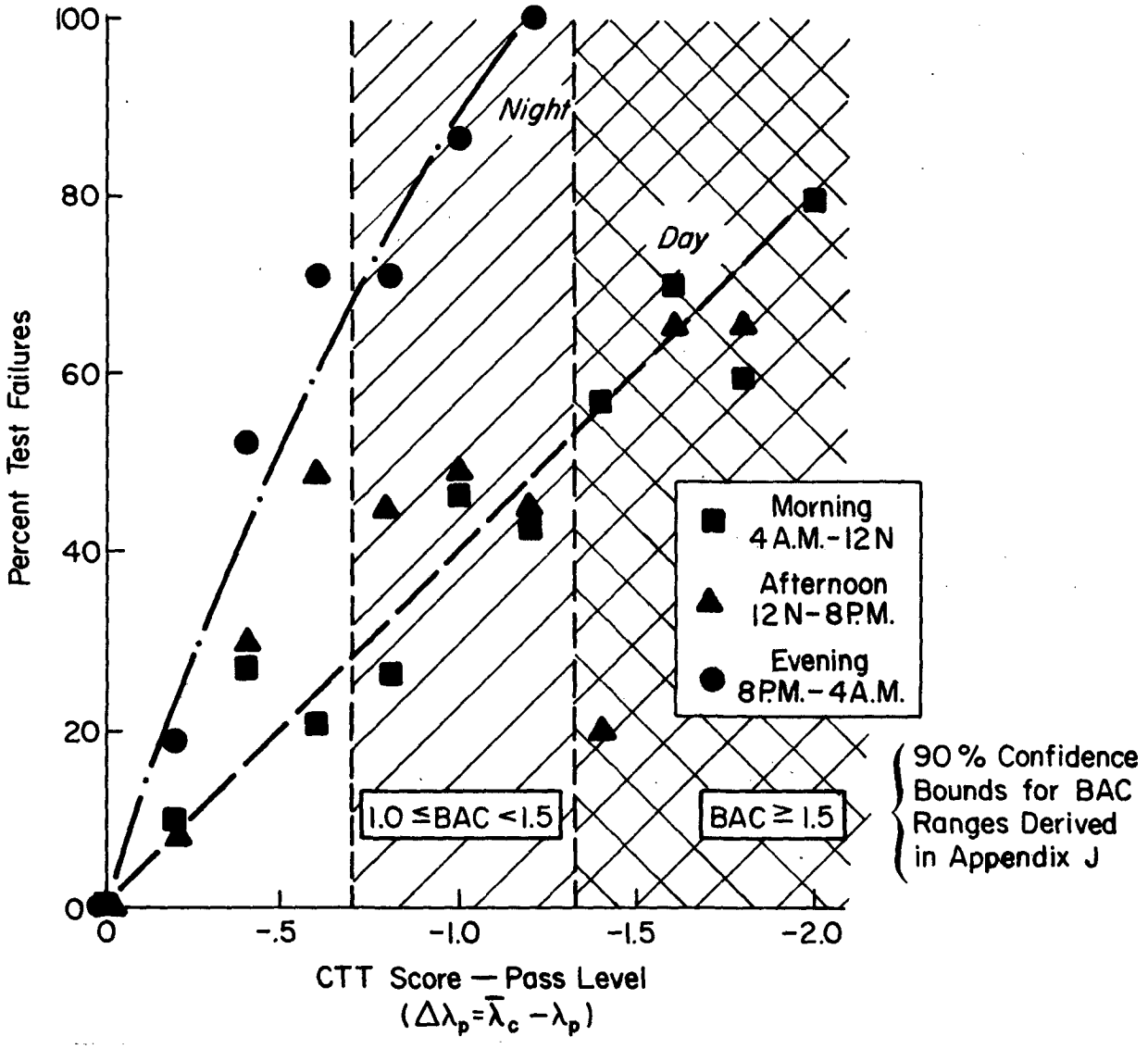

Figure 8. Failure Rate as a Function of Differental Test Score (CTT Score - Pass Level). Test Failure Percentage Computed from Figure 6 Data for Each Eight Hour Time Block at Each Differential Test Score: Percentage Test Failure = 100 × No. Fails/(No. Fails + No. Passes)

This results in relative low test scores for estimated BAC levels (or low estimated BAC's for given differential scores). Also, the Fig. 8 results depend on the distribution of BAC's for the various time intervals. The Day vs. Night difference in test failures in Fig. 8 is probably indicative of a larger percentage of sober drivers during the day time period, rather than a difference in test discriminability between day and night.

D. IN-DEPTH ANALYSIS

During the check-in periods the experimenters had the opportunity to question subjects about failures as discussed in Section III and Appendix H. Many subjects were quite candid about whether failures were due to impairment or not (even drug impairment in two cases). In other cases, as discussed in Appendix H, the circumstances surrounding failures (e.g., time, score level) were used to infer whether or not subjects were impaired. The biweekly in-depth analysis also allowed the experimenter to inquire about the circumstances surrounding episodes of driving with the alarms active (as recorded by the data logger when the test was not passed and the car exceeded 10 mph).

Results are given in Table 5. Total test failures have been partitioned according to whether the driver was felt to be sober, impaired, or whether some other problem might have caused the failure (problems were indicated when the subject was not allowed four trials and DDWS required a ten minute wait, which is the consequence for test failures). Total failures were as indicated by the histograms in Appendix I. Sober failures were assumed to be indicated by differential test scores greater than -0.4 (i.e., $\Delta\lambda > -0.4$). As noted in Appendix J, Fig. J-2, this amounts to a 95 percent level of confidence that BAC was less than 0.05 percent wt/vol. In the case of subject 19, it was felt that his pass level in the beginning was set too high, so his total failures for $\Delta\lambda > -0.2$ were used. Problem failures were interpreted from the in-depth analysis, and the impaired failures were assumed to be given by

$$F(\text{Impaired}) = F(\text{Total}) - F(\text{Sober}) - F(\text{Problem})$$

TABLE 5. CATEGORIZATION OF TEST FAILURES
BASED ON IN-DEPTH ANALYSIS

SUBJECT NUMBER	TEST FAILURES				
	TOTAL	SOBER ($\Delta\lambda_p > -0.4$)	PROBLEM	IMPAIRED	TRIPS WITH ALARMS
01	36	9	3	24	0
05	20	6	8	6	0
06	5	3	0	2	0
07	4	2	1	1	0
08	6	4	1	1	0
09	4	3	1	0	0
10	14	9	2	3	0
11	8	4	1	3	0
12	17	9	1	7	0
13	38	26	6	6	0
14	29	12	12	5	0
15	6	5	0	1	0
16	4	3	2	0	0
17	26	5	10	11	1
19	112	24*	8	81	5
20	13	12	0	1	1
22	9	4	2	3	0

*$\Delta\lambda_p > -0.2$

As noted in Table 4, even if we account for sober and problem failures, there still remain a significant portion of impaired failures, with two subjects accounting for the majority of these.

Three subjects are also noted from Table 4 to have driven with the alarms on. Details on these episodes are given in each subject's case history in Appendix I. Subject 19 actually admitted to driving his car without passing the test after drinking. This constituted a fairly serious violation of one of the conditions of probation, and the court was so notified. Subject 19 was cooperative, however, and we recommended he be permitted to remain in the program. Details of this episode are given in Appendix I.

E. DEBRIEFING DATA

Comments and opinions about the DDWS concept and its application were obtained throughout the field test program. The majority of opinion feedback was obtained in structured debriefings with people directly involved with the project, using the questionnaires exhibited in Appendix G. Other feedback was obtained on a more informal basis from persons who came in contact with the project in one way or another. This debriefing information can be summarized in general categories as follows.

1. Subjects

The greater amount of debriefing information was obtained from the subjects, and their relatives and colleagues. A detailed summary tabulation of this information is given in Appendix H. In every case subjects claimed they would be willing to take the DDWS option again, in spite of the fact that several subjects were either embarrassed or intimidated by the car. All subjects also felt that DDWS was effective in deterring drunk driving, although four subjects said they passed the test after some drinking.

Four subjects indicated they drove another vehicle while their license was restricted to DDWS. Two drove another vehicle when problems developed with the DDWS equipment, one drove his truck once a week around the block to keep the battery charged, and the fourth drove his own car in an emergency when he could not pass the DDWS test.

In spite of the failure rates indicated previously in this section and in Appendix I, none of the subjects felt that contending with DDWS was a serious hardship. Most of the subjects would prefer DDWS as a sanction, compared to fines, jail, restricted or suspended license, or the year long California treatment programs. Two subjects ranked fines first and DDWS second as most preferrable.

The DDWS concept does not have any known rehabilitative functions. However, there was some feeling that the DDWS made subjects aware of the

impairment effect of drinking. Also, some subjects reported less drinking. Other activity changes were reported by subjects, relatives, and colleagues that would tend to reduce drinking and driving. There is no indication, however, of how permanent these changes might be.

2. Judges

At the conclusion of the experiments we debriefed the three judges having the most contact with the DDWS sanction. Judge G. Tom Thompson of the Compton Municipal Court; Judge Hiroshi Fujasaki of the Los Angeles County Superior Court, formerly judge of the West Los Angeles Municipal Court; and Judge Sherman Smith of the Los Angeles Municipal Court, also formerly at West Los Angeles.

The structured debriefing forms used are found in Appendix G. Answers to these questions have been edited for brevity and clarity in the following discussions.

- None of the judges expressed any problems with subject selection.
- Judge Thompson felt there should be a central screening person for all courts in his jurisdiction. (This was extant at West Los Angeles where all DWIs were screened by a County Public Health Officer who recommended various sentences.)
- All judges mentioned that follow-up procedures only indicate when something was wrong.
- In their limited contacts with court personnel, attorney's, offenders, law enforcement, and the public, none of the judges encountered any negative comments and reported that there was a positive attitude toward the system.
- The only incidences after DDWS assignment with defendants were mentioned earlier in this section and Appendix I.
- The judges all felt that the DDWS should be addressed mainly to multiple offenders, and should be used in conjunction with other sanctions.

- They all felt the DDWS was more effective than any current sentencing option in preventing or altering DWI trips. They stated that they felt the altering effect of the alarms prevented most trips, and altered or postponed the others.

- There were no court implementation problems encountered. Once they were given legal authority to use the DDWS in sentencing, it was the same as any other sanction.

- They all felt that to make DDWS available to all defendants it needs to be 1) smaller; 2) less expensive; and 3) multi-user. There also need to be provisions for indigent defendants.

- Judge Thompson also indicated that he would like to direct a Los Angeles County wide DDWS demonstration project.

3. Miscellaneous

In addition to debriefing the subjects and judges involved in the project, we also obtained comments from law enforcement personnel; Senator Hershel Rosenthal (ex-Assemblyman); Susan Weight, President of Californians for Sober Highways; and Bart Furtado, our DMV liaison.

We interviewed two law enforcement officers having direct contact with DDWS subjects. The first officer stopped one of our subjects for speeding. He was driving his own car, and not the DDWS vehicle, a direct violation of probation. The subject's drivers license was annotated on the back that the license was only valid in the DDWS car. Mechanisms were also in place that would have alerted the officer to the restriction. In this case the officer neither checked the back of the subject's license nor checked with his dispatcher. He simply wrote the ticket. The subject chose to attend traffic school, keeping the ticket from going on his record (our final method for detecting license actions). We would have never known about the ticket if the subject had not told us!

When we questioned the officer about his actions, he replied that he was on "ticket duty." His job was to catch speeders on this street and write tickets in an attempt to slow average traffic speed. If he took

the time to call each license in, he would write less tickets. He did not look at the back of the license because he did not see a need to. This case represents one scenario where, despite all our contingency plans, a violation went undetected (however, as stated earlier, the subject informed us).

The second officer from whom we obtained comments represented a case where not only did the notification system work, but the STI person on-call received 3 calls, spaced about 20 minutes apart, and starting at 3 a.m. The officer involved noticed the DDWS vehicle parked on the street in a local housing project. The officer approached the vehicle because it did not have a parking permit, and noticed the occupants "fleeing into a nearby apartment." Upon shining his flashlight into the interior the officer saw both illegal fireworks and empty beer cans. He proceeded to the apartment he saw the people run to. When he identified who the driver was, and checked both the registration and the drivers license, he had his dispatcher phone STI for instructions on vehicle disposition.

When we spoke with the officer he indicated that he had been aware of the DDWS research because of media publicity. He was not aware that this was a DDWS vehicle until he read the registration. In general he had positive comments about the DDWS concept, and felt that our system for informing law enforcement personnel of their role when involved with a DDWS defendant was "more than adequate."

Bart Furtado was the California DMV employee assigned to handle the DDWS project, and served as liaison for all DMV interactions. He saw to it that the DDWS license restrictions were applied; flagged DMV records to output any license inquiry to him; obtained driving records; and, in general, was a key person in the successful operation of the test phase of the project.

In his debriefing, Mr. Furtado indicated that while the project took some time, there was no grief and it did not interrupt any work processes. He also stated that there were no logistical problems or public relations problems for DMV as a result of their involvement. "In general," he stated, "the project worked out quite well."

Mr. Furtado also discussed methods of future implementation. As we discovered, it was possible for someone to "slip through a crack" and not be detected when in violation. He indicated that there is currently some discussion in Sacramento about altering the drivers license format to make all endorsements and restrictions visible from the face of the license. These would be keyed to a specific endorsement or restriction, and if punched would indicate a particular item would apply.

Ms. Susan Weight is President of Californians for Sober Highways, a powerful state citizen's group. She has followed our research since the appearance of the first newspaper article. She has been a strong supporter of the system, and has mentioned the research in all of her public information talks. She indicated that she would like to see the system implemented with multiple offenders, in combination with other minimum sanctions. Her idea is that the defendant pays a minimum fine, does minimum jail time, and is allowed to retain his or her driver's license on a restricted basis for 1 year if the person permanently installs a DDWS, and goes to treatment for one year. The person would be allowed to earn an unrestricted driving privilege after 6 months based on treatment performance. Otherwise she would want a 1 year suspension. (This is similar to California's current second offender sanctions, but adds DDWS.)

Ms. Weight would also like to have a DDWS vehicle available to her group for demonstrations and lectures. She sees usefulness in student education as well as informing the general public.

Senator Herschel Rosenthal carried the DDWS bill in the Legislature when he was an Assemblyman. He has been in constant contact with STI throughout the project, and offered the following comments:

- Once the bill was passed he felt the legislature forgot it existed.
- He supports mandatory use for multiple offenders.
- He also supports strong educational efforts aimed at promoting voluntary use by individuals who recognize a potential DWI involvement.

- He feels the sanction is more effective in preventing DWI trips than any of the current sentencing options.

- He is willing and eager to sponsor additional legislation to continue research efforts or to bring DDWS into the arsenal of sentencing options.

F. EQUIPMENT RELIABILITY AND MAINTAINABILITY

Much of the reliability and maintainability experience has been touched on in Section III. Virtually every vehicle and DDWS system had multiple problems initially, but the vast majority of these were overcome as the pilot testing and field test assignments progressed. Discussion of the various failure modes is best broken down according to vehicle and DDWS apparatus problems as follows:

1. Vehicles

Vehicle problems can be subdivided into issues associated with safety of operation, and problems with equipment that must interface with the DDWS apparatus. First, consider operational safety issues. Major mechanical problems with steering systems on two of the cars were resolved and occurrence of other problems is not predictable. Tuneups and brakes are a continuing maintenance item that will have to be contended with if these vehicles are used again. For future DDWS implementation in the user's own vehicle these issues will be the owner's responsibility.

Several vehicle systems interface with the DDWS apparatus and are critical to proper DDWS operation. Problems arose as follows.

a. Battery/Charging System

DDWS depends on this vehicle system for its electrical power. If the system fails completely, then neither the car nor DDWS will operate, which is a benign failure from an impaired drive deterrence point of view. Partial failures or marginal operation which affects DDWS operation while permitting the car to be driven is a more serious problem.

Charging problems were a significant issue as discussed previously, and the extra electrical load DDWS caused on the system may have been a contributing factor. For further application of the current vehicles the charging systems should be thoroughly checked, and weak components replaced with new or reconditioned parts. Future DDWS implementations for installation on user owned vehicles should be designed to tolerate any vehicle battery/charging conditions under which the vehicle can still be operated.

b. Seat Presence Switch

The seat presence switch used by DDWS to detect driver presence was a General Motors part originally intended as a seat belt interlock. These switches did not always work reliably, which in part may have been due to the way they were mounted on the seat springs and the seating posture of some subjects. Problems were corrected by new switches, sometimes mounted in a different location or orientation. This system element should be carefully checked out if the current equipment is used again. For future systems the issue of driver presence detection should be given some further thought and possibly combined in some way with seat belt use sensors.

c. Door Switch

One failure was encountered in the door switch which controls dome lighting, and is also used by DDWS as a sensor to detect door opening. These switches should be checked if the current equipment is to be used again. Future DDWS systems would probably use whatever door sensors are available on a given user's vehicle, and would have to be checked for proper functioning.

2. DDWS Equipment

Problems with DDWS operation were associated with the power interface, steering sensor, and miscellaneous electrical components. Data recording reliability was also influenced by problems with the electronic interface. Details on these problems are as follows.

a. Power Interface

The car electrical system represents a fairly variable voltage source due to rather crude regulation. Sensitive electronic components must be protected from this environment by good voltage regulators. Modifications in the current DDWS equipment were made in order to achieve reliable operation and protect electronic components from excessive voltage levels. These modifications corrected failures and problems encountered early in the test program. Future designs should include conservative allowances for car system voltage variations (i.e., 10-16 volts).

b. Steering Sensor

The potentiometer used to sense steering wheel position tends to wear out and develop dead spots over a period of time, particularly at the null point which corresponds to straight ahead driving. Several potentiometers failed during the course of the pilot tests and early field tests. In regards to the current equipment, the potentiometers should all be replaced before any further usage. For future systems, another sensor approach (e.g., optical, magnetic) should be employed. It is still desirable to use the steering wheel as the control device, however, because it naturally relates to driving and can be manipulated even by subjects with significant hand tremor.

c. Seat Weight Sensor

A seat mounted strain gage sensor and associated electronic circuits were developed on this project to provide a means of subject identification (Volume I, Allen, et al., 1982). The device contains a window comparator that can be adjusted to a narrow band about a given subject's weight. The device performed reliably during laboratory testing, and electronically has never failed. During the field test we were not able to obtain reliable indications of subject weight, however. The basis for the measurement depends on weight distribution on the seat, which can vary according to posture and amount of clothing. These variations

were much greater in the field test than experienced in laboratory testing. Although the apparatus is reliable, the weight indication is quite prone to variation. Perhaps better seat placement could reduce the variability. Further work will be required in order to develop a practical weight sensor system.

d. Miscellaneous Electrical Components

Two additional problems were experienced with the DDWS electronics. One problem was encountered with film on card/chassis connections which probably accumulated during the long storage period. Thorough cleaning, and adjustment of the card hold down bar solved these problems. Before further use of the current equipment, these card connections should probably be cleaned again. Future systems would probably be designed with single board computers so this problem would be avoided.

A second problem was encountered when an electromechanical relay became unreliable. The relay was replaced and no further problems were encountered. This would appear to be an isolated failure, and no further relay problems would be anticipated in the current equipment. All electronic relays should be considered for future applications.

SECTION V

DISCUSSION AND CONCLUSIONS

A. OVERVIEW

The discussion in this section is based on the analysis and interpretation of the field study results and addresses the two basic objectives of the overall project:

- Estimate the potential utility of DDWS for deterring DWI trips in the vehicle in which it is installed
- Understanding and solving practical operational issues related to the field implementation of DDWS

In addressing these objectives in this section, the analysis of recorded data is first discussed in Article B. Interpretation of the recorded data analysis allows statements to be made about the field discriminability of DDWS in response to the first objective above.

The second objective above is first addressed by reviewing project experience and debriefing data in Article C that was obtained throughout the project. Reliability and maintainability data are also germane to practical implementation of CTT/DDWS and are addressed in Article D. More general issues associated with the effectiveness and deterrence value of the CTT/DDWS are discussed in Article E in the light of experience gained on this project. Future evaluation of DDWS may employ the current apparatus, or consider new hardware implementations, and these considerations are discussed in Article F.

Finally, NHTSA has raised a number of specific questions that are to be directly addressed in the final report on this project. The questions are stated in Article G along with answers based on field test results reported in this document, and also based on the results of laboratory investigations reported in Volume I (Allen, et al., 1982) of this final report.

B. RECORDED DATA

Recorded data was analyzed to look for DDWS influence on driving patterns, subject performance and the ability of DDWS to detect impaired drivers. Requiring the driver to take the CTT test with or without the DDWS alarms activated seemed to have little effect on day or night driving patterns. The relative amount of test passing and failing did not change significantly between week days and weekends, but did change rather dramatically with time of day. Day time failure rates were about what was expected (i.e., $\cong$ 2.5%) based on the procedure used to set individualized CTT pass scores. Nightime failure rates were three to seven times greater than this level, however, and were consistent with laboratory discriminability results where BAC was controlled for and actually measured.

Based on in-depth analysis of data made during the subjects' biweekly check-ins, DDWS failures were partitioned according to whether they were felt to be due to impairment or other possible problems or extenuating circumstances. This in-depth analysis of task failures gives a more conservative estimate of DDWS discriminability, and even here a significant portion of failures were still considered to result from driver impairment.

To the extent that the BAC estimation procedure derived in Appendix J is adequate it is felt that the CTT/DDWS maintained reasonable impaired driver discriminability in a field setting. As to whether subjects drove after test failure, in-depth analysis showed only three subjects drove with the alarms on (a violation of probation which is recorded by the DDWS data logger). One subject was determined to have driven while impaired, and even in this case there is some indication that the drive was made at low speed. Thus, test failure would appear to significantly deter DWI trips.

There was some indication of over training for several subjects such that they received excessively high pass scores initially. Less intensive training would help solve this problem. Also, an adaptive pass score algorithm should be developed for future DDWS designs, that will

slowly account for long term performance trends that were in evidence for several subjects in this study. If such an adaptive scheme were incorporated in the CTT/DDWS, training could perhaps be shortened to two supervised sessions from the three sessions used in this project.

C. PROJECT EXPERIENCE AND USER OPINIONS

A significant effort was mounted in obtaining official approval to conduct the DDWS project in California. This included gaining the support or avoiding opposition from State government agencies, and passing special legislation required to permit DDWS as an alternative sanction for DWI offenders with a second offense. This approval process was carried out without serious opposition; and once the objectives, approach and background of DDWS were given a fair hearing, official opposition was circumvented.

The courts and California Department of Motor Vehicles carried out their part in project support without serious problems. The courts do need an individual to take charge of subject screening, however, as was available through the West Los Angeles Municipal Court. Also, license restriction needs to be indicated on the front of the license to alert enforcement personnel and others (e.g., car rental agencies) of the restriction. California is currently investigating this feature and may provide it in the near future.

Public acceptability for the DDWS concept has been quite good, again once the objectives, approach and background have been fairly presented. News media accounts of DDWS were fair and many times positive, although occasionally with some minor misinformation. Positive opinions have also been elicited by other individuals associated with the drunk driving problem, including relatives and colleagues of the DWI offenders employed here as subjects.

Finally, subject acceptance was quite good. No one found the DDWS to be a hardship, and most found it to be a desireable and effective sanction. Most subjects would choose DDWS as compared to fines, license restriction or suspension, or jail.

D. RELIABILITY AND MAINTAINABILITY

Significant early problems with the vehicles and DDWS equipment were encountered, but overcome. Most of the serious problems were associated with the vehicle's charging system, car voltage variation sensitivity in the DDWS apparatus, and infant mortality problems in the data logger electronics. These problems were completely overcome, however, after completion of about the first third of the field test. Vehicle and DDWS sensors must be thoroughly checked. The steering wheel sensor on the current system required periodic replacement, and the vehicles battery/charging system must be kept up to factory specification.

The current equipment could be used again for several more subjects, providing that the vehicle electrical system and the DDWS steering wheel sensor are maintained. Maintenance personnel familiar with the CTT/DDWS equipment and its installation would be required. Most of the reliability and maintenance experience is irrelevant to new designs using state-of-the-art technology, however. New systems should be designed with a better, nonwaring, steering sensor. The design should also take into account wide variations in vehicle battery/charging system voltage (i.e., 10-16 volts). These points are treated further below.

E. GENERAL EFFECTIVENESS AND DETERRENCE

There are a variety of issues that relate to the potential effectiveness and deterrent value of the CTT/DDWS against drunk driving. These issues range from the specific question of the sensitivity of CTT performance to alcohol impairment, to whether DWI drivers will circumvent their restricted driving privilege, to the broader issues of the proportion of the DWI driver population to which CTT/DDWS provides a suitable sanction and whether there is any more general deterrence value to the existence and availability of a CTT/DDWS sanction. While the work reported in Volumes I and II of this report deal directly with the more specific issues of effectiveness as discussed below, it is worthwhile also considering the more general deterrence issues in the context of the experience on this project. The following discussion proceeds

from the specific questions of effectiveness to the general issues of deterrence.

The sensitivity of CTT performance to alcohol impairment was dealt with in detail in Volume I which reviewed past laboratory experiments and described the results of a validation experiment performed as a part of this project. The CTT/DDWS can detect drivers at 0.10 BAC about 35 percent of the time, and drivers at 0.15 BAC about 80 percent of the time, using a strategy in which the driver is permitted four attempts in which to pass the test. During the field test experiment reported in this volume, since BAC information was not available, a procedure was developed (Appendix J) for estimating BAC from CTT performance scores. Using BAC estimates based on performance scores, it was shown that subjects typically failed the CTT/DDWS test at elevated BAC's. While this procedure cannot be used to directly infer the CTT/DDWS alcohol discriminability in the field test, the results are not inconsistent with laboratory work reported in Volume I.

A driver given the CTT/DDWS sanction could choose to circumvent it in several ways in order to drive while intoxicated. Subjects could have attempted to have someone else take the test when they were impaired. The test is difficult enough, and the seatbelt and door interlocks such that this is not felt to be a practical possibility, and there was never any indication that it occurred. No evidence of equipment tampering was detected on this program, and only a few instances of driving with the alarms activated were noted. These cases presumably occurred under special circumstances, and no evidence was obtained of truly dangerous alcohol impaired driving of a CTT/DDWS equipped vehicle.

An obvious means of circumventing the CTT/DDWS sanction is simply to drive another vehicle. To discourage this, the subjects' driver's licenses were restricted to the operation of the CTT/DDWS vehicle assigned to them. Impounding the subject's own car was also considered, but rejected due to legal and other practical constraints. One driver received a speeding ticket on the project while driving his own personal vehicle, however, his license restriction was not detected. Two subjects admitted to driving their own personal vehicles during their

final debriefing, and other subjects were suspected of occasionally using their own personal cars. No subjects were ever picked up for driving while intoxicated, however, or involved in traffic incidents which might have pointed to alcohol involved driving. Circumvention of the CTT/DDWS sanction might be considered in the same vein as license revocation. There is evidence that DWI drivers with suspended licenses have better driving records than controls permitted to keep their licenses (Hagen, 1978). Even though evidence suggests that a significant number of suspended drivers continue to operate vehicles, it is conjectured that they drive more carefully. The CTT/DDWS sanction might be considered as another form of licensing control.

Viewing the CTT/DDWS as a form of licensing control brings up the more general issue of what proportion of the convicted DWI driving population would be eligible or suitable for the CTT/DDWS sanction. In this project convicted DWI drivers were nominally screened to select those with a need for regular transportation and who would otherwise act responsibly under the restrictions of the DDWS sanction. Procedures were not established for rigorously monitoring or carrying out this screening, however. Screening in the West Los Angeles Municipal Court was handled through a public health officer, while individual judges effectively selected subjects in the Compton Municipal Court. Only one subject was dropped because of his behavior subsequent to CTT/DDWS assignment, and there is no evidence of any traffic incidences, alcohol involved or otherwise, with any of the DDWS vehicles.

There is no data to suggest what percentage of convicted DWIs could be assigned a CTT/DDWS sanction. In future applications there might be problems with multiple users in single vehicle families which were not addressed here. Further research would be required to determine means for accommodating more than one driver with a CTT/DDWS equipped vehicle. For general application, the feasibility and cost of installation on a wide range of vehicles must also be addressed. A system for probationary follow-up such as the biweekly check-in sessions used on this project must also be considered.

Regarding the problem of the general deterrence of drunk driving, the CTT/DDWS should be considered in the same vein as other sanctions for DWI conviction. As discussed in Summers and Harris (1978) only a very small percentage of DWI trips are detected by the police, so that court administered sanctions can only influence a small part of the DWI problem. To the extent that publicity about tough measures against drunk driving can have some influence on overall deterrence, perhaps the routine assignment of DDWS sanctions would have a positive influence on the public's perception of the probability of being detected and convicted of driving while intoxicated. It should be noted, however, that some investigators feel it is very difficult to maintain this public perception over any length of time (Ross, 1981).

F. FUTURE OPTIONS

1. Short Term Options (< 3 years)

Basically, the CTT/DDWS equipment is checked out and operational and procedures in place as described herein for subject selection, assignment and performance monitoring during the period of the DWI sanction. Further testing is possible with the current equipment in a program with similar procedures. The cars are approximately 5 years old and have gone about 30-40 thousand miles. They should be in good enough condition to run reliably for another two years. This would allow testing with perhaps four more subjects per car or an additional subject population of eighty. However, knowledgeable and experienced maintenance personnel would be required to maintain the vehicles and CTT/DDWS equipment.

The test plans described herein could be easily adapted for use in other court systems. The data reduction programs are in place on a NHTSA time sharing computer system, so they can be easily accessed with a remote terminal and telephone line coupler. Thus, the current testing program is quite portable, and should be easily adaptable to court systems throughout the U.S. (Note: The current computer unit cannot tolerate extremely low temperatures, and a heater modification should be considered for cold weather operation).

2. Midterm Options (3-5 Years)

The current DDWS equipment was designed almost a decade ago and the technology is out of date and obsolete by todays standards. If the DDWS concept is found viable then updated equipment design should be considered for future extensive testing. Current state-of-the-art technology would permit a much smaller and more self contained unit (i.e., smaller than a shoe box) with vastly improved capability including:

- Advanced micro processor to increase computational power. This would permit more sophisticated test strategies to increase discriminability and provide for some online data reduction.
- Solid state memory to replace the current digital cassette recording medium for recording usage data.
- Solid state display to replace the current electro mechanical meter.

The state-of-the-art design could be scaled for a modest size production run (e.g., 100 units) which would permit some economy in packaging and assembly. These units would be used in a setting where subjects provide their own car, and the reduced size should improve the installation effort. Procedures for providing the installation would have to be worked out, but would be comparable to installing a car stereo set.

As a mid-term option other scenarios should also be considered for DDWS application. Some possibilities include:

- Insurance company requirement for high risk drivers
- Voluntary installation to reduce insurance rates
- Routine installation in fleet vehicles (e.g., cabs, trucks, busses)
- A card key modification to permit multiple driver's with different pass criteria levels
- Roadside sobriety tester

- Installation to detect other types of driver impairment (e.g., drugs, fatigue, etc.)

- Voluntary installation for general impairment and improper driver detection

3. Long Term Option (> 5 Years)

Long term use of the DDWS countermeasure should consider volume production to minimize per unit cost, and means for simplifying vehicle installation. Production design modifications should be considered for large production runs (e.g., > 1000 units). Vehicle installation could be simplified by encouraging vehicle manufacturers to provide a connector in the wiring loom where the DDWS unit could be conveniently plugged in (some vehicles already have a connector in the steering column wiring loom which could be used directly for this purpose).

G. SPECIFIC QUESTIONS

1. How sensitive is the device for differentiating the subject's performance level at various Blood Alcohol Concentration levels?

   Laboratory tests showed a test failure rate of about 35 percent at a BAC of 0.10 percent of weight/volume and about 80 percent at a BAC of 0.15 percent weight/volume. Analysis of the field test data in this document are not inconsistent with the laboratory data. This assessment depends on the validity of the inferred BAC procedure discussed in Question 2.

2. What type of classification scheme can be developed for inferring an individuals BAC level from the DDWS scores obtained in the field?

   Analysis of past laboratory data has shown a reliable and consistent relationship between CTT (Critical Tracking Task) score and BAC. Using these past results a simple relationship is developed in this document to relate CTT performance to BAC:

$$BAC = \sqrt{\frac{0.1 - \Delta\lambda_p}{48}}$$

   where $\Delta\lambda_p$ is the differential CTT score with respect to the pass level:

$$\Delta\lambda_p = \text{Score} - \text{Pass Level}$$

   Confidence limits for attributing BAC levels to test score ranges are derived in Appendix J.

3. How often was the car driven with alarms activated?

   Three subjects drove the car with alarms active. Two of these episodes were minor, involving moving the car a short distance under emergency conditions. One episode involved repeated car movement over a several hour period, however, and was brought to the attention of the court as a violation of probation.

4. What changes in driving behavior (e.g., DDWS car usage) patterns occur during the time the vehicles are assigned to the convicted DWIs and the alarms are activated (experimental periods) and deactivated (baseline periods)?

   There was a slight tendency for fewer trips with the alarms active. However, this trend was not consistent over time periods during the day and weekdays as compared to weekends.

5. How long does it take to train drivers (e.g., convicted drunk drivers and family members) in the use of the equipment?

   Training for convicted DWIs took place over a two week period including three supervised sessions of about 2-1/2 hours in length. This regime was found to overtrain drivers, however, and could perhaps be shortened to two sessions for many subjects. Also, if automatic adjustment algorithms for the pass level are added to future equipment, supervised training could be further reduced.

   Family members were not trained, but similar experience would be expected.

6. Is there a minimum usage rate of the performance device in order for the individual to maintain proficiency in the test?

   There is probably some lower limit, but it was not experienced in these tests. Three of the least active drivers in the field test reported in this document drove on the average of less than 10 times per week and managed to maintain proficiency (i.e., they maintained a nominal failure rate at a stable pass criterion level).

7. To what extent can it be inferred that circumvention reduces the effectiveness of the system for deterring DWI trips?

   No evidence of circumvention of the DDWS device was evident in the field evaluation. Two subjects did admit to driving other vehicles in their final debriefing, however.

8. Would judges who participated in the study be willing to routinely assign convicted DWIs to such a treatment approach?

   Based on interviews with the judges who were involved with the assignment of the CTT/DDWS sanction, there is a great deal of enthusiasm for eventual incorporation of the DDWS into the court system. However, none of the judges, or public health officers, see the DDWS as a treatment approach! All involved parties see the use of the DDWS sanction as part of an overall sentencing scheme involving some combination of fines, jail, treatment, community service, and DDWS.

9. Are DWIs willing to use a DDWS equipped vehicle in lieu of other sanctions, e.g., license suspension?

   Yes, all field test subjects gave the DDWS a high preference rating. Two subjects would have preferred fines, and the remainder ranked DDWS as the most desirable sanction as compared to fines, license restriction and suspension, and jail.

10. What are some of the significant factors that should be used in selecting DWIs as candidates for the DDWS?

    DWIs who are given a DDWS sanction as part of their overall sentence should have a need for personal transportation, such as commuting to work or carrying out family responsibilities, and basically be "socially responsible." This is indicated in part by 1) holding a job; 2) maintaining liability insurance; and 3) otherwise being in some way a productive member of society.

11. Do problems arise for family members and others who also must use the DDWS car?

    This issue was not addressed in the current field test evaluation.

12. Is the DDWS equipment sufficiently reliable and rugged to operate over extended periods of time (up to 6 months) in the field?

    This level of reliability was achieved during the second assignment of the DDWS vehicles. However, the battery/charging system must be up to factory specifications, and steering potentiometers should be replaced prior to assigning the car for six months. New equipment designed with state-of-the-art technology would be less sensitive to these problems.

13. How frequently does the CTT/DDWS require maintenance and calibration?

    The steering potentiometer should be replaced every six months, and the battery/charging system should be checked. Effective use of the current CTT/DDWS equipment requires knowledgeable, experienced maintenance personnel.

14. How often must it be inspected?

    The system installation and seals should be inspected routinely during probationary check-ins in order to prevent circumvention.

15. What are the estimated costs associated with fabrication and use of the DDWS in the field?

    In our opinion, DDWS apparatus designed with state-of-the-art technology could be produced in volume for not much more than car stereo equipment. Installation cost would also be comparable to that of stereo equipment.

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APPENDIX A

LEGAL OPINIONS

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Roland Lee Coleman, J. D.
Legal Consultant
NHTSA Contract DOT-HS-8-02052

11 April 1979

REQUEST FOR LEGAL OPINION

RE: Possible Legal Restraints on Drunk Driver Warning System (DDWS) as an Alternative to License Suspension

FACTS:

Prior to 1976, the law in California required that the license of a person convicted for a second offense of driving under the influence of an intoxicating liquor (DWI) be suspended for one year. In answer to the obvious hardship this imposed on people who had not committed any heinous crimes, the California Legislature, pursuant to Senate Bill 330 (Gregorio 1975), amended the existing law to allow an individual with a second DWI conviction to retain his or her license if such person enrolled in a year-long program designed to treat that individual's alcohol-related problems.

In an effort to continually improve the effectiveness of programs and methods to deal with individuals with multiple DWI convictions, the DDWS has been developed under Federal DOT sponsorship. In order for the effectiveness of such a system to be tested on multiple DWI conviction individuals, some type of arrangement must be worked out with the courts for the tests to be administered. One method would be restricting a multiple offender's driving activities to a DDWS-equipped vehicle as a condition of probation, and also placing that person under close observation.

QUESTION:

Does the current law permit a DDWS to be the only alternative to license revocation

ANSWER:

Yes (on a local basis).

DISCUSSION:

Under the current law Section 13352 of the Vehicle Code requires that a driver's license shall be suspended for one year following a sceond conviction of DWI in five years. The word "shall" is utilized in regard to suspension and thereby makes suspension of the driving privilege mandatory.

Section 23102.1 of the Vehicle Code permits the courts to suspend mandatory imprisonment pending enrollment and successful completion of a one-year program for second-conviction DWI offenders. Section 13352.5 of the Vehicle Code allows a person who has enrolled in such a program to retain his license upon a second conviction

There does, however, appear to be a mechanism in the legal system to allow a person to substitute a DDWS for enrollment in the year-long program. Several possibilities were examined. One such possibility was the striking of the prior

conviction for purposes of sentencing, which hopefully would have the effect of having only one conviction licensing sanctions. The authorization for striking a prior conviction is found in Section 23102(g) of the Vehicle Code. However, the relief of the action applies only to the criminal penalties such as mandatory jail time and payment of the fine.

In the case of Nicolino v. Cozens (1973) 33 C.A.3d 1024, the trial court judge struck the defendant's prior conviction and recommended to the Department of Motor Vehicles that the defendant's license not be suspended. However, pursuant to Section 13352 of the Vehicle Code, the defendant's license was suspended.

The Appellate Court held that it would violate legislative intent to allow a trial court to order the Department of Motor Vehicles (DMV) not to suspend such an individual's license when the statutory language obligates the DMV to suspend the driving privileges. The court also held that the striking of a prior conviction is not the equivalent of a determination that the individual did not sustain a conviction. The court further held that such a dichotomous scheme of regulation does not violate the doctrine of separation of powers. Thus, striking a prior conviction as indicated above would not allow a person to keep his license and utilize a DDWS as a condition of probation without also having the person on the year-long program.

It would appear difficult to have a judge put a person only on a DDWS program in order to avoid license suspension for a second conviction. Section 11850.4 of the Health and Safety Code sets out some of the standards for the DWI programs. The language calls for close and regular supervision which also includes in-person interviews once every other calendar week. There also appears to be an encouragement of group activities and therapy in order for a program to be acceptable. A bare DDWS with nothing else would appear to not meet such standards on their face. After acquisition of the regulations adopted by the Department of Health on 1 March 1979, a better picture of any other requirements will be obtained.

In regard to the one possible method to impose only a DDWS as a condition of probation and as an alternative to license suspension, a type of pretrial diversion program appears to be the answer. Such a situation would involve a plea bargain whereby the judge, defendant, and prosecutor would agree to forego any proceeding for a fixed period of time, conditioned upon successful utilization of the DDWS by the defendant for that period. Upon successful utilization of the DDWS, the DWI charge may be dropped or reduced to a lesser charge such as reckless driving. As long as the prosecutor and judge are willing to go along with such an arrangement, there does not appear to be any serious problem. However, if neither one is willing to go along with such a program, the defendant's and the program's hands are tied.

Legislation allowing such pre-trial diversion would ensure a more statewide application of such a program. It would take away the fear of judges' actions being appealed by prosecutors if the judges allowed defendants to take part in such programs. But since there is no statutory or case law authorization for such a program, judges and prosecutors may be reluctant to implement it.

The other obvious situation in regard to utilization of the DDWS would be to combine it with the programs currently approved. The case law is well established that something like a DDWS may be made a condition of probation. The California Supreme Court case of People v. Lent (1975) 15 C.3d 481, would certainly indicate such.

CONCLUSION:

It would appear that in order to utilize the DDWS alone as an alternative to license suspension on a statewide basis, an amendment to Senator Gregorio's bill is necessary. However, on a local basis, a pre-trial diversion system may be employed with cooperative judges and prosecutors. DDWS can also be made an additional condition of probation under currently approved programs.

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October 31, 1979

LEGAL OPINION

TO: Tony Stein

FROM: Roland Coleman

RE: Potential Liability Due to Malfunction of DDWS Wherein Third Party Is not Warned of Drunk Driver and Is Injured

FACTS:

This opinion is concerned with the fact situation involving a driver on the DDWS program who has consumed enough alcohol to become under the influence of the intoxicating beverage. He enters his automobile, takes the test and somehow passes it notwithstanding his being under the influence of alcohol. He is driving down the street and injures either a pedestrian or another driver who is unaware of the condition of the intoxicated driver. The injured third party then decides to sue STI on the theories of strict liability in tort and negligence.

QUESTION:

Can STI be held strictly liable in tort if the DDWS fails to reject an intoxicated driver and a third party is injured?

ANSWER:

No.

DISCUSSION:

The landmark case for strict liability in tort is Greenman v. Yuba Power Products, Inc. (1963) 59 Cal. 2d 57. That case held that a manufacturer is subject to strict liability in tort when said manufacturer places a product on the market that is either defective in its design or assembly, knowing that it is to be used without inspection for defects and the product proves to have a defect that causes injury to a person.

After extensive research in this area it appears that technically STI cannot be said to be placing a product on the market. Such activity is one of the prerequesites for strict liability in tort. The reason for this conclusion is that STI is an engineering firm and as such provides services rather than a product. One of the leading cases in this area is Stuart v. Crestview Mutual Water Co.

(1973) 34 C.A. 3d 802.

Since engineers do not place products on the market they are not in the same standing as manufacturers who do and who can therefore best bear the burden of spreading the costs for injuries caused by defective products.

One factor which indicates that STI is not a manufacturer is that STI is being paid on the basis of developing a type of system and is not being paid on a perunit basis.

Also an argument can be made that engineering firms should be placed in a category analogous to that of a pharmaceutical company. In the recent case of Mc Creery v. Eli Lilly & Co. (1978) 87 C.A. 3d 77, the appellate court rejected the imposition of strict liability when some injury is caused by a new or experimental drug. The court felt that due to a lack of time and opportunities for extensive medical experience there can be no assurance of absolute safety of new or experimental drugs. However, if the product is properly manufactured and marketed with the proper attendant warning if necessary, the broad good such a product may bestow outweighs any known yet reasonable risks and therefore dictates against exposing the manufacturer to strict liability. The court cited as a guideline Restatement Second of Torts, Section 402A, comment K. That comment appears to also be applicable to companies such as STI which promote the advancement of technology.

Another reason why STI should be able to defeat any claims of strict liability is that the DDWS is to be inspected by the participant in the program each time the participant starts his vehicle.Since each device is adjusted for each individual's level of tolerance, the participant should be aware of his feelings as to sobriety when the machine was adjusted for his level of tolerance. Such person should be aware that the device is malfunctioning if the car starts when the person feels similar to when the machine rejected him when it was being adjusted for his tolerance. Also one of the conditions of probation for the participants is not to consume any alcoholic beverage within twenty-four hours of driving.

The above discussion deals with the current state of law. There is always the possibility that the courts may wish to change the law to further extend such liability. Such an extension presently appears remote.

QUESTION:

Can STI Be Liable for Simple Negligence

ANSWER:

Yes.

DISCUSSION:

If the DDWS does fail to properly function when an intoxicated driver tries to start the vehicle, an injured third person can sue and possibly prevail on a theory of negligence. The theory would be based on STI affirmatively assuming the duty of warning the public about the presence of an intoxicated driver. A plaintiff could allege that negligence in design causing the warning system not to operate, was a concurrent cause with the errant driving of the intoxicated driver in injuring the plaintiff. In other words, if the warning system were in operation, either the third party would have been made aware of the intoxicated driver's presence and thereby taken some evasive action or the police would have been able to easily identify such a person and remove him from the streets. Such issues appear to be questions of fact for a jury to resolve.

As to the ultimate question of negligence on the part of STI, such negligence can only be found if STI does not adhere to the standard of care of engineers in its field. As long as STI adheres to such standards, there should be no finding of negligence.

COUNTY OF LOS ANGELES
OFFICE OF THE COUNTY COUNSEL
648 HALL OF ADMINISTRATION
LOS ANGELES, CALIFORNIA 90012

JOHN H. LARSON, COUNTY COUNSEL

March 12, 1980

974-1901

Honorable Hiroshi Fujisaki
Judge, Municipal Court
1633 Purdue Avenue
Los Angeles, California 90025

Re: Drunk Driver Warning System Project

Dear Judge Fujisaki:

In a letter dated January 11, 1980, you requested this office's opinion on the following questions:

1. Can the court utilize the drunk driver warning system as an alternative to the drunk driver education program in the sentencing of second offenders within the terms of Vehicle Code Section 23102.1?

2. Can the court utilize the drunk driver warning system as a sentencing and probation tool?

3. Will any additional liability accrue to the County if the drunk driver warning system is used as a sentencing and probation tool?

4. Are there any other legal objections to the utilization of the drunk driver warning system as a sentencing and probation tool?

Our answer to these questions is as follows:

1. The court cannot utilize the drunk driver warning system as an alternative to the drunk driver education program in sentencing second offenders under the provisions of Vehicle Code Section 23102.1.

2. The court can utilize the drunk driver warning system as a sentencing and probation tool.

3. No additional liability will accrue to the County if the drunk driver warning system is used as a sentencing and probation tool.

4. We can think of no additional legal objections to the utilization of the drunk driver warning system as a sentencing and probation tool.

A N A L Y S I S

Vehicle Code Section 23102.1 authorizes the court to suspend the sentence of a person convicted of a second drunk driving offense if that person consents to participate for at least one year in a program for drinking drivers authorized by Health and Safety Code Sections 11837, et. seq.[1/]

These sections of the Health and Safety Code set forth the requirements for programs for drinking drivers. Section 11837.4 requires that the programs for drinking drivers be approved by the state and meet standards established by the state. The standards must include

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1/ The sections of the Health and Safety Code mentioned in your letter were renumbered by the 1979 Legislature but were otherwise unchanged. Stats. 1979, Ch. 679. The new numbers are used throughout this opinion.

"close and regular supervision of the person, including face-to-face interviews at least once every other calendar week" (Section 11837.4(a)(1) and "shall include a variety of alcohol services for problem drinkers and alcoholics or shall have the capability of referring such persons to . . . appropriate alcohol services." Section 11837.4(a)(3)

> "A county or program may not prescribe additional program requirements unless such requirements are specifically approved by the department."
>
> Section 11837.4(c)

The drunk driver warning system consists of a device to prevent a person unduly under the influence of alcohol or drugs from driving an automobile. Such a mechanical system does not meet the statutory requirements contained in Section 11837.4. The use of such a mechanical system obviously does not envision any treatment for the drinking driver but merely prevents him from driving while incapacitated through the use of alcohol or drugs.

Based on the foregoing, it is our advice that the court cannot use the drunk driver warning system manufactured by Systems Technology, Inc., as an alternative to the drinking driver rehabilitation programs authorized by Health and Safety Code Sections 11837, et. seq.

A condition of probation, however, requiring a person that has been convicted a second time of drinking under the influence of drugs and/or of alcohol to use an automobile equipped with a drunk driver warning system would be reasonable.

> "A condition of probation will not be held invalid unless it '(1) has no relationship to the crime of which the offender was convicted, (2) relates to conduct which is not itself criminal, and (3) requires or forbids conduct which is not reasonably related to future criminality . . .' Conversely, a condition of probation which

requires or forbids conduct which is not itself criminal is valid if that conduct is reasonably related to the crime of which the defendant was convicted or to future criminality."

People v. Lent (1975) 15 Cal.3d 481, 486

The assignment of the drinking driver to an automobile equipped with a drunk driver warning system does bear a direct relationship to the crime of which he was convicted and helps inhibit future criminality. Such a requirement, of course, is reasonably related to the crime of which he was convicted.

The court, in granting probation under Penal Code Section 1203.1, is clearly acting in its judicial capacity. The doctrine of judicial immunity from damage actions for acts performed by a judge acting in his judicial capacity is very well established. Taylor v. Nitzel (1978) 82 Cal.App.3d 665; Paddleford v. Biscay (1971) 22 Cal.App.3d 139; Stump v. Sparkman (1978) 435 U.S. 349. The imposition of a condition of probation, as described above, would not therefore result in any increase of liability for the County.

We can think of no additional legal objections to the utilization of the drunk driver warning system as a sentencing and probation tool.

If you have any further questions on these matters, we would be most happy to answer them.

Yours very truly,

JOHN H. LARSON
County Counsel

By Michael H. Dougherty
Michael H. Dougherty
Division Chief

APPROVED AND RELEASED

John H. Larson
JOHN H. LARSON
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MHD:dcf

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November 7, 1980

LEGAL OPINION

To: Anthony Stein

From: Roland Coleman

Re: Validity of Drunk Driver Warning System (DDWS) Project Probation Conditions

FACTS:

Systems Technology, Inc. (STI), in conjunction with cooperating local courts, will administer a program wherein individuals convicted of driving while under the influence of alcohol a second time within five years must adhere to probation conditions developed by STI and the courts. Some of the conditions are well established and do not warrant an examination for validity. Other conditions are peculiar to the DDWS project and therefore should be examined for validity. Those conditions are:

1) Participation in the DDWS project;

2) Report to STI for training and subsequent check-in;

3) Obey all rules and conditions of STI in conjunction with the research projects;

4) Driver's license restricted to use of the STI vehicle;

5) No one else may drive the STI vehicle;

6) The subject is not to drive without automobile insurance with STI as additionally insured.

Question;

Do the above listed conditions appear to be valid?

Answer:

Yes.

Discussion:

A California Supreme Court case, People v. Lent (1975), 14 Cal. 3d 481, stated standards to be applied in an examination of the validity of conditions of probation. Those standards are that the conditions must have a relationship to the crime which was committed, relate to conduct which itself is criminal, and must require or forbid conduct which is reasonably related to future criminality.

The above stated conditions all appear to meet the standards stated above. They all relate to driving which certainly has a relationship to the crime for which the project participants were convicted. They relate to conduct which itself is criminal, i.e., if the driving occurs occurs while a person is under influence of alcohol. The conditions do require or forbid conduct which is reasonably related to future criminality. In other words, all the above conditions are valid because they tend to reduce the potential for the reoccurrence of the subject offense and encourage behavior modification for the better with no undue burdens.

An additional factor that legitimizes the above stated conditions is an amendment to the California Vehicle Code which states the need for the DDWS project and authorizes the utilization of it by the courts. This ammendment, Assembly Bill 3482, is a statement of public policy in support of the DDWS project and its goals. It is support for the listed conditions of probation because the legislature considered them during passage of the bill.

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November 12, 1980

MEMORANDUM

To: Tony Stein

From: Roland Coleman

Re: Impounding Vehicles of Participants in the Drunk Driver Warning System (DDWS) Project

FACTS:

Participants in the DDWS project will be provided specially equipped vehicles which preclude them from starting vehicles if they are under the influence of alcohol. The vehicles also have special sensory devices to make certain the participants are the only ones starting the vehicles and using them regularly. However, there is some concern that if participants have their own vehicles they will use them on some occassions to circumvent the restrictions of the project. In order to try to insure against the possibility of such an abuse, one suggestion has been made wherein the participants' vehicles will be impounded for six months as a condition of probation.

QUESTION:

Is impounding of the participants' vehicles a valid condition of probation?

ANSWER:

No.

DISCUSSION:

There is authority for impounding the vehicles of first time offenders if they are under 21 years of age. However, this section of the Vehicle Code, Section 23102(i) only authorizes the impounding for not less than one day and not more than 30 days.

Section 14602 of the Vehicle Code authorizes a court to impound the vehicle of a person convicted of driving with a suspended license for six months for the fist offense and for one year for a

second offense.

There is no authority for impounding vehicles as a condition of probation for persons in the situation as that of the project participants. There is case law that states a condition of probation is valid if it has a relationship to the crime of which the person was convicted, relates to conduct which in itself is criminal, and requires or forbids conduct which is reasonably related to future criminality. On the surface, impounding the participants' vehicles appears to meet such standards. However, a participant can challenge such a condition of probation as contravening public policy. This argument bears merit because such a condition would not comply with the conditions and situations the legislature has established for impounding vehicles.

A successful challenge of a probation condition suspending a person's driving privilege for a period longer than that authorized by the Vehicle Code was based on such an argument according to Witkin, California Crimes (1963),Section 1077.

Another successful challenge of a probation condition was in the case of In re Gonzales, (1974) 43 C.A. 3d 616. A judge placed a defendant on probation with the condition that if the Adult Authoritydid not revoke his current parole the judge would revoke his probation and send him to prison. When the Adult Authority allowed the defendant to remain free the judge revoked his probation and sentenced him to prison. The defendant appealed and the appellate court held that the judge had exceeded his authority. The court also held that the Adult Authority had certain statutory functions and the judge had exceeded his authority by trying to influence those functions. If the judge felt the defendant belonged in prison he should have sentenced him to such and not tried to influence the Adult Authority or abdicate to another entity his authority to sentence the defendant to prison.

Based on the above, it appears that a challenge to impounding participants' vehicles for six months would be successful. This is because the legislature has declared when and how long a vehicle may be impounded and the participants in the project either would not be subject to the statutory provisions or the proposed period would exceed that authorized by statute.

QUESTION:

Would impounding the vehicles be impractical?

ANSWER:

Yes.

DISCUSSION:

In California many families possess more than one vehicle. These families may have several vehicles registered to one person or several persons. There would be absolutely no authority for im-

pounding all such vehicles. Thus, some of these vehicles would still be available for use by participants. Such a situation makes impounding of one vehicle ineffective and thereby impractical.

In any event, the sensory safeguards substantially minimize the potential for abuse.

APPENDIX B

ENABLING LEGISLATION

TABLE OF CONTENTS

Assembly Bill No. 3482

CHAPTER 1377

An act relating to the drinking driver.

[Became law without Governor's signature. Filed with Secretary of State October 1, 1980.]

LEGISLATIVE COUNSEL'S DIGEST

AB 3482, Rosenthal. Drunk driver warning system.

Existing law requires the suspension of the driving privilege for at least one year, with certain exceptions, including court-approved participation in a treatment program, of a person convicted of second drunk driving offense.

Based upon certain legislative findings and declarations, this bill would authorize Systems Technology, Inc., for the purposes of completing its contract with the U.S. Department of Transportation for the period ending January 1982, to employ a rigorous experimental design testing the utility of the Drunk Driver Warning System for deterring drunk driving trips among persons convicted of a second drunk driving charge, on no more than 24 subjects in Los Angeles County who have been convicted of a second offense of driving under the influence of alcohol, and whom the municipal courts within Los Angeles County, in conjunction with Systems Technology, Inc., determine are eligible to participate in the research project.

The bill would provide exemptions from mandatory procedures for second drunk driving offenders and from experimental equipment permit provisions under current law. The bill would be operative only until January 1, 1983, unless a later enacted statute deletes or extends such date.

The people of the State of California do enact as follows:

SECTION 1. The Legislature finds and declares as follows:

(a) Alcoholism is the most serious drug problem in California.

(b) The annual economic costs of alcohol abuse and alcoholism amount to four billion two hundred million dollars ($4,200,000,000) in California.

(c) Drinking drivers cause substantial fatalities, permanent disability, and property damage on California highways, and some individuals repeatedly drive while under the influence of alcohol.

(d) The development of alternative alcohol countermeasures for individuals convicted of a second or subsequent incident of drunk driving should be encouraged.

(e) The National Highway Traffic Safety Administration of the United States Department of Transportation has awarded to Systems

Technology, Inc., four hundred fifty thousand dollars ($450,000) to test the effectiveness of the Drunk Driver Warning System as Contract DOT-HS-8-02052.

(f) Laboratory studies suggest that the Drunk Driver Warning System could deter, or interfere with, a large percentage of trips in which the driver was impaired by alcohol, and the Drunk Driver Warning System has been designed to warn other drivers of the presence of an impaired driver on the roadway.

(g) The results of the project authorized by this act will be of importance to the Legislature in determining the effectiveness of in-vehicle countermeasures designed to reduce the threat of drinking drivers to the public's peace, health, and safety.

SEC. 2. Systems Technology, Inc., for the purposes of completing its contract with the United States Department of Transportation for the period ending January 1982, may employ a rigorous experimental design testing the utility of the Drunk Driver Warning System for deterring drunk driving trips among persons convicted of a second drunk driving charge, without the confounding effects of treatment, on no more than 24 subjects in Los Angeles County who have been convicted of a second offense of driving under the influence of alcohol in violation of Section 23102 of the Vehicle Code.

SEC. 3. Any Los Angeles Municipal Court, in lieu of authorized disposition under existing law, may refer a second offender to Systems Technology, Inc., for screening. If accepted into the pilot project authorized by Section 2 of this act, a person shall not be subject to license suspension under Section 13352 of the Vehicle Code. If not so accepted into the pilot project, a person shall be subject to all the provisions of existing law as carried out by the court and other designated agencies.

SEC. 4. The pilot project authorized under Section 2 of this act is not a program for purposes of required approval under Chapter 9 (commencing with Section 11837) of Part 2 of Division 10.5 of the Health and Safety Code.

SEC. 5. (a) Notwithstanding the requirements of subdivisions (e) and (f) of Section 23102 of the Vehicle Code, the court may suspend execution of the sentence, as to the imprisonment of any person convicted for a second offense under Section 23102, if the person has consented to participate in a program approved pursuant to this act, the court has referred the person to such a program, and the person has been accepted. If at any time the person is found by the court to have failed to comply with the rules and regulations of the program or does not successfully complete the program, the court shall revoke such suspension or shall revoke and terminate probation, or both, and shall proceed in the manner provided in subdivision (c) of Section 1203.2 of the Penal Code.

(b) When the court has imposed sentence as provided in subdivision (a), the Department of Motor Vehicles shall suspend the driving privilege pursuant to Section 13352 of the Vehicle Code.

SEC. 6. For the purposes of this act, Systems Technology, Inc., shall not be required to obtain, nor shall the Department of the California Highway Patrol be required to issue, a permit pursuant to Section 26106 of the Vehicle Code. Vehicles which are permitted under this act to be equipped with the drunk driving warning system may automatically flash the hazard warning lamps or blow the horn intermittently, notwithstanding any contrary provisions of the Vehicle Code.

SEC. 7. This act shall be operative only until January 1, 1983, and on that date is repealed, unless a later enacted statute, chaptered on or before January 1, 1983, deletes or extends such date.

AMENDED IN SENATE SEPTEMBER 10, 1981

AMENDED IN SENATE AUGUST 25, 1981

AMENDED IN SENATE AUGUST 10, 1981

AMENDED IN ASSEMBLY JUNE 9, 1981

AMENDED IN ASSEMBLY APRIL 6, 1981

AMENDED IN ASSEMBLY MARCH 23, 1981

CALIFORNIA LEGISLATURE—1981-82 REGULAR SESSION

ASSEMBLY BILL No. 541

Introduced by Assemblymen Moorhead, Bergeson, Dennis Brown, Chacon, Costa, Cramer, Elder, Farr, Filante, Goggin, Greene, Harris, Imbrecht, Johnston, Kelley, Konnyu, La Follette, Leonard, Levine, Martinez, McAlister, McCarthy, Nolan, Ryan, Sher, Statham, ~~Dave Stirling,~~ Wray, and Young

~~(Principal coauthor: Senator Rains)~~ *(Principal coauthor: Assemblyman Dave Stirling)*

(Coauthors: Senators Craven, Garamendi, Johnson, Nielsen, ~~and Presley~~ *O'Keefe, Presley, and Rains*)

February 18, 1981

An act to add Section 1463.18 to the Penal Code, and to amend Sections 13201, 13352, 13352.5, 14601, *14601.1,* 40000.11, and 40000.15 of, to amend and renumber Sections 23101, as amended by Section 2 of Chapter 1004 of the Statutes of 1980, 23102, as amended by Section 4 of Chapter 1004 of the Statutes of 1980, 23102.2, 23102.3, 23102.4, 23107, 23121, 23121.5, 23122, 23122.5, 23123, 23123.5, 23123.6, 23125, and 23126 of, to add Section 14601.2 to, a heading immediately preceding Section 23100 of, and Article 2 (commencing with Section 23151) to Chapter 12 of Division 11 of, to add and repeal Article 3 (commencing with Section 23231) of Chapter 12 of Division

11 of, and to repeal Sections 13201.5, 13210, 23101, as amended by Section 3 of Chapter 1004 of the Statutes of 1980, 23102, as amended by Section 5 of Chapter 1004 of the Statutes of 1980, 23102.1, 23105, as amended by Section 8 of Chapter 1004 of the Statutes of 1980, 23105, as amended by Section 9 of Chapter 1004 of the Statutes of 1980, 23106, as amended by Section 10 of Chapter 1004 of the Statutes of 1980, and 23106, as amended by Section 11 of Chapter 1004 of the Statutes of 1980, of, the Vehicle Code, relating to offenses.

LEGISLATIVE COUNSEL'S DIGEST

AB 541, as amended, Moorhead. Offenses: driving under the influence: penalties.

(1) Existing law prohibits driving a vehicle when under the influence of intoxicating liquor, any drug, or a combination of intoxicating liquor and any drug. Under existing law, $35 of each fine or forfeiture for a conviction of driving under the influence of intoxicating liquor, any drug, or a combination thereof, or for reckless driving is required to be used for criminalistics laboratory services for analysis of the content of alcohol in blood, breath, or urine or for the presence of controlled substances. Existing law provides minimum and maximum fines, imprisonment, or both for violations of this driving prohibition, varying in amount and time depending on the type of offense, the existence of a prior conviction of an offense which occurred within 5 years, and whether bodily injury or death occurred in conjunction with the offense. Existing law provides for minimum imprisonment in the county jail and minimum fines if probation is granted following conviction with a prior offense. Under existing law, the minimum fines will be reduced on July 1, 1982.

Existing law also provides for the suspension or revocation of a person's privilege to operate a motor vehicle for, among other things, driving while under the influence of intoxicating liquor or drugs or the combined influence thereof.

Existing law also prohibits possession, drinking, and storage of alcoholic beverages in motor vehicles under specified circumstances.

This bill would recast and reorganize the provisions of law

relating to driving under the influence to prohibit driving under the influence of an alcoholic beverage, as defined in the bill, any drug, or a combination thereof. The bill would eliminate the penalty difference dependent upon the type of prior offense, would increase the minimum fine to $375, and require $20 of this fine to be transferred to the Indemnity Fund in the State Treasury for the indemnification of victims of crime, as specified.

The bill would delete the general requirement for the court to suspend the privilege of any person to operate a motor vehicle for up to 6 months upon conviction of driving under the influence of an alcoholic beverage or any drug or the combined influence thereof, and would delete the general requirement to order the Department of Motor Vehicles to suspend the driving privilege for a violation of that offense not involving bodily injury or death of another person.

The bill would require the department ~~, unless otherwise ordered by the court,~~ to suspend, ~~or restrict~~ as ordered by the court, the privilege for ~~90 days to~~ 6 months for a first ~~or second~~ conviction of that violation not involving bodily injury or death ~~or~~ . *The bill would require the department to suspend that privilege for 1 year* for a second conviction of that violation ~~involving bodily injury or death to another~~ *and to revoke it for 3 years for a third or subsequent conviction.* The bill would require the department to ~~revoke~~ *suspend* the privilege for 1 year for a first conviction of that violation involving bodily injury or death to another. The bill would require the department to revoke the privilege for 3 years for a *second conviction and 5 years for a* third or subsequent conviction of that violation ~~not~~ involving bodily injury or death to another ~~and for 5 years for a third or subsequent conviction of that violation involving bodily injury or death to another~~.

The bill would except from the suspension or revocation for second offenses those persons certified to treatment programs as specified.

The bill would prohibit a stay of proceedings before acquittal or conviction or a dismissal of the proceedings because the accused participates in a driver improvement program or treatment program for habitual users of alcohol or

drugs.

The bill would require, on conviction, that the court sentence the offender and not stay or suspend imposition of sentence.

The bill would change the penalties for a conviction as follows:

(a) On a first conviction not involving bodily injury or death, the bill would require a sentence of imprisonment in the county jail for 48 hours to 6 months and a fine of $375 to $500. If the court grants probation, the bill would require participation and completion of a driver improvement or alcohol treatment program and either (1) a mandatory imprisonment in the county jail of at least 48 hours and a mandatory fine of at least $375, or (2) a fine of $375 and a restriction on driving for 90 days to permit driving only to and from, or in, the person's work. Weekend service of imprisonment would be allowed.

(b) On a second conviction not involving bodily injury or death within 5 years of a prior violation resulting in a conviction, the bill would require a sentence of imprisonment in the county jail for 90 days to 1 year and a fine of $375 to $1,000. If the court grants probation, the bill would require either (1) a mandatory imprisonment of at least 10 days in the county jail, a mandatory fine of at least 10 days in the county jail, a mandatory fine of at least $375, and revocation of the driving privilege for 1 year, or (2) imprisonment for at least 2 days, a fine of at least $375, the driving privilege restricted to permit driving only to work and for treatment, and participation for 1 year in a specified treatment program. The bill would, after conviction of second offenses involving alcohol and with a grant of probation of the second of those conditions, provide for revocation of probation or new specified terms of probation on failure in treatment, and the bill would also provide for early termination of the driving restriction.

(c) On a third conviction not involving bodily injury or death within 5 years of 2 or more prior violations resulting in convictions, the bill would require revocation of the driving privilege for 3 years by the department and a sentence of imprisonment in the county jail for 120 days to 1 year and a fine of $375 to $5,000. If the court grants probation, the bill would require mandatory imprisonment of at least 120 days in the county jail, a mandatory fine of at least $375, and, if the offender has not previously successfully completed a specified treatment program, that he or she participate in that specified treatment program.

(d) On a first conviction involving bodily injury or death, the bill would require a sentence of imprisonment in the state prison, or in the county jail for 90 days to 1 year, and a fine of $375 to $1,000, and revocation of the driving privilege for 1 year by the department. If the court grants probation, the bill would require mandatory imprisonment of at least 5 days in the county jail and a mandatory fine of $375.

(e) On a second conviction involving bodily injury or death within 5 years of a prior violation resulting in conviction, the bill would require a sentence of imprisonment in the state prison, or in the county jail for 90 days to 1 year, and a fine of $375 to $5,000. If the court grants probation, the bill would require either (1) revocation of the driving privilege for 3 years, mandatory imprisonment of at least 120 days in the county jail, and a mandatory fine of $375, or (2) imprisonment for at least 30 days in the county jail, a fine of at least $375, a 3-year restriction on driving only to work and for treatment, and participation for 1 year in a specified treatment program. The bill would, under the second of those conditions, provide for revocation of probation or new specified terms of probation on failure in treatment.

(f) On a third conviction involving bodily injury or death within 5 years of 2 or more prior violations resulting in convictions, the bill would require revocation of the driving privilege for 5 years by the department and a sentence of imprisonment in the state prison for 2, 3, or 4 years and a fine of $1,000 to $5,000. If the court grants probation, the bill would require imprisonment of at least 1 year in the county jail, a fine of at least $375, restitution or reparation as specified, and, if the offender has not previously successfully completed a specified treatment program, that he or she participate in that specified treatment program.

The bill would prohibit a court from striking any prior conviction for the purpose of avoiding the minimum time of

imprisonment and fines provided, and would require a court to obtain specified records relating to prior convictions. The bill would require the court to notify each court where a prior conviction occurred.

The bill would require, in any case where probation is granted, that the probationary term be 3 years and the bill would specify the marking and notice requirements for restricted licenses authorized under the bill. The bill would require, upon finding of a violation of probation, that the court revoke suspension of sentence and revoke or terminate probation, except as specified.

The bill would also reorganize certain other provisions of existing law restricting alcoholic beverages in vehicles.

(2) Under existing law, there is a State Advisory Board on Alcohol-Related Problems, but no First Offender Program Task Force.

This bill would create the First Offender Program Task Force with 9 members appointed by the Governor, as specified. Under the bill, that task force would be required, on or before April 30, 1982, to determine and report to the Legislature the statewide advisory guidelines for first offender programs and define first offender for such purposes. Under the bill, the task force would serve without compensation or reimbursement of expenses, and the State Department of Alcohol and Drug Programs would be required to provide necessary staff services. The bill would repeal the provisions relating to the First Offender Program Task Force on January 1, 1983.

(3) Under existing law, a pilot project conducted by Systems Technology, Inc. until January 1, 1983, under federal contract to test the Drunk Driver Warning System is excepted from certain provisions of law affected by this bill.

This bill would expressly declare that the provisions of law relating to that pilot project are not superseded, terminated, or otherwise affected by this bill.

(4) Existing law prohibits a person from driving a motor vehicle on the highway when that person's driving privilege is suspended or revoked for, among other things, driving under the influence of intoxicating liquor or any drug, or the combined influence thereof, with knowledge of the

suspension or revocation. The punishment for a violation of that prohibition is 5 days to 6 months in jail and a fine of not more than $500, and, on a second conviction, a punishment of 10 days to 1 year in the county jail and a fine of not more than $1,000.

This bill would recast those provisions, adding driving with a restricted license except in compliance with the restriction to the prohibition. The bill would, if the court grants probation upon a violation of those provisions, require a mandatory imprisonment of at least 10 days in the county jail upon a first offense and at least 30 days for a second or subsequent offense within 5 years of a prior offense.

(5) *The bill would incorporate additional changes in Sections 23101 and 23102 of the Vehicle Code and related provisions of law proposed by AB 7, AB 348, and AB 571, or any of them, and this bill, to be effective if this bill and any or all of AB 7, AB 348, and AB 571 are chaptered, whether this bill is chaptered before or after any or all of those bills.*

(6) Article XIII B of the California Constitution and Sections 2231 and 2234 of the Revenue and Taxation Code require the state to reimburse local agencies and school districts for certain costs mandated by the state. Other provisions require the Department of Finance to review statutes disclaiming these costs and provide, in certain cases, for making claims to the State Board of Control for reimbursement.

However, this bill would provide that no appropriation is made and no reimbursement is required by this act for a specified reason.

Vote: majority. Appropriation: no. Fiscal committee: yes. State-mandated local program: yes.

The people of the State of California do enact as follows:

SECTION 1. Section 1463.18 is added to the Penal Code, to read:

~~1463.18. Notwithstanding the provisions of Section 1463, out of the moneys deposited with the county treasurer pursuant to Section 1463, twenty dollars ($20) for each conviction of a violation of Section 23152 or 23153~~

23208. If any person is convicted of a violation of Section 23152 or 23153 and the vehicle used in the violation is registered to that person, the vehicle may be impounded at the registered owner's expense for not less than one day nor more than 30 days.

SEC. 42. Article 3 (commencing with Section 23231) is added to Chapter 12 of Division 11 of the Vehicle Code, to read:

Article 3. Driving Under the Influence Offender Programs

23231. A First Offender Program Task Force is hereby created which shall consist of ~~nine~~ *10* members appointed by the Governor, as follows:

(a) Three persons representing county alcohol programs.

(b) Two persons representing providers of alcohol treatment programs for drinking driver offenders.

(c) One person representing the judiciary.

(d) One person representing the State Advisory Board on Alcohol-Related Problems.

(e) One person representing the State Department of Alcohol and Drug Programs.

(f) One person representing prosecuting attorneys.

(g) One person representing the Department of Motor Vehicles.

23232. On or before April 30, 1982, the First Offender Program Task Force shall determine and report to the Legislature the statewide advisory guidelines for first offender programs. For the purposes of this article, "first offender" means a person convicted of an offense punished under Section 23160 or 23180.

23233. The members of the First Offender Program Task Force shall serve without compensation and shall not receive reimbursement for travel or other expenses for services rendered.

23234. The State Department of Alcohol and Drug Programs shall provide necessary staff services to the First Offender Program Task Force.

DDWS EXEMPTION

23235. Notwithstanding the provisions of Sections 23165, 23166, 23167, and 23168, or any other provision of law, the program conducted under the provisions of Chapter 1377 of the Statutes of 1980 shall not be superseded, terminated, or otherwise affected by the amendment, repeal, or reenactment of provisions relating to driving under the influence of alcohol by the enactment of the act which adds this article, chaptered during the 1981–82 Regular Session of the Legislature.

23236. This article shall remain in effect only until January 1, 1983, and as of that date is repealed, unless a later enacted statute, which is chaptered before January 1, 1983, deletes or extends that date.

~~SEC. 34.~~

SEC. 43. Section 40000.11 of the Vehicle Code is amended to read:

40000.11. A violation of any of the following provisions shall constitute a misdemeanor, and not an infraction:

Division 5 (commencing with Section 11100), relating to occupational licensing and business regulations.

Section 12500, subdivision (a), relating to unlicensed drivers.

Section 12951, subdivision (b), relating to refusal to display license.

Section 13004, relating to unlawful use of identification card.

Section 14601, relating to driving when suspended.

Section 14601.1, relating to driving when suspended.

Section 14601.2, relating to driving when suspended.

Section 14610, relating to unlawful use of driver's license.

Section 15501, relating to use of false or fraudulent license by minor.

~~SEC. 35.~~

SEC. 44. Section 40000.15 of the Vehicle Code is amended to read:

40000.15. A violation of any of the following provisions shall constitute a misdemeanor, and not an infraction:

Sections 23103 and 23104, relating to reckless driving.

Section 23109, relating to speed contests or exhibitions.

APPENDIX C

MEDIA COVERAGE

"There is no claim of therapy. . . . The hope is that the program will eliminate drinking driver trips'

Drunk-o-meters may be a car accessory

By Gale Cook
Examiner Capitol Bureau

SACRAMENTO — Your wife is looking out the front window. "You ought to see this," she says. You go to the window and watch.

Your neighbor, who likes a few belts and recently was nailed a second time for drunken driving, is walking unsteadily toward his car.

He gets in but doesn't start the engine immediately. Instead, he seems to be fiddling with the steering wheel, turning it back and forth. This goes on for a few minutes. Then, in seeming exasperation, he guns the motor into life and pulls into the street.

The car's emergency hazard lights are flashing as your neighbor drives away, and as he picks up speed the horn begins to honk. He passes from view, but you still hear the horn . . . beeeep, beeeep, beeeep . . . once every second.

"What's that all about?" your wife wonders.

That was your neighbor flunking his Critical Tracking Test, an idea of the U.S. Department of Transportation in its search for a drunken-driving warning system (DDWS). Your neighbor was required to have the DDWS package installed in his car as a condition of probation after his last conviction.

He failed the simple behavioral task to test his sobriety when he got into the car. The system's electronic observer recorded this fact and caused the warning lights to flash and the horn to honk when the car was operated.

Your neighbor would not get very far, because the lights and the blowing horn are legal "probable cause" for any cop to pull him over.

This scene, of course, is fantasy. Drunken drivers in California are not required to equip their cars with such warning systems. Whether they ever will is going to depend on tests and experiments that will take several years to complete.

A bill by Assemblyman Herschel Rosenthal, D-Los Angeles, would authorize Los Angeles County courts to let 24 second-offense drunken drivers participate in such a program operated by Systems Technology Inc., of Hawthorne, under a $450,000 contract with the Department of Transportation's National Highway Traffic Safety Administration.

AB3482 will be heard tomorrow in the Assembly Criminal Justice Committee.

Systems Tech has 10 DOT-owned 1978 Chevys equipped with DDWS packages. The heart of the system is a foolproof meter, with a centered needle indicator, attached to the steering column and connected to electronic sensors and a cassette recorder in the car's trunk.

The meter measures the driver's performance of the "critical tracking task (CTT)" in a manner developed in the 1960s to test how astronauts would function in conditions of weightlessness and confinement.

The driver gets in the car, closes the door and turns on the ignition. It has to be the court-assigned driver because the seat is adjusted to that driver's weight. The probationer's wife, for example, cannot drive the car without triggering the warning system. Nor can anyone else take the test for the probationer.

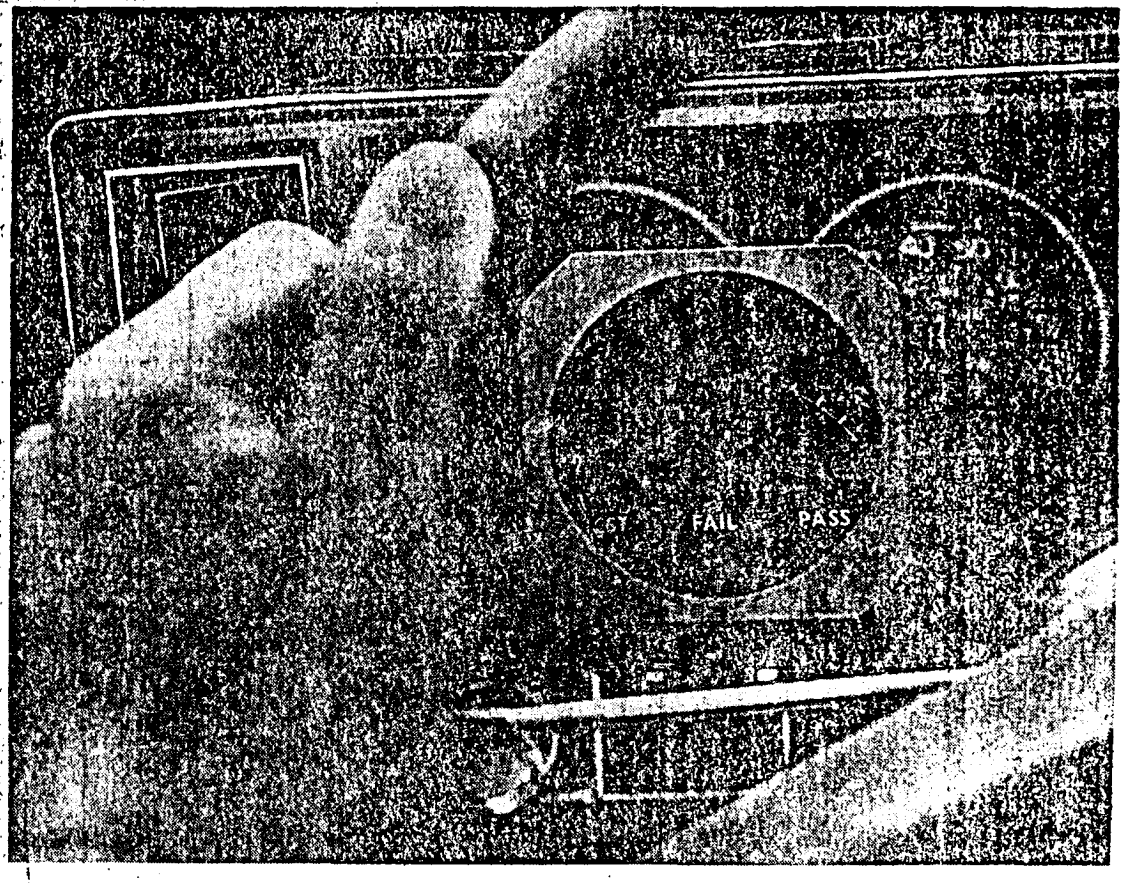
When the driver turns on the ignition, the hazard lights begin to flash. He has to pass the test to turn them off and deactivate the circuit that causes the horn to honk when the car reaches 10 miles an hour. The test is to watch the needle and keep it dead center for a few seconds by gently and rapidly turning the steering wheel left and right.

It sounds easy, and it is — if the driver is sober, and if he has been trained to proficiency in the test, which involves both speed and dexterity.

Anthony Stein, staff engineer-psychologist with Systems Tech, said a candidate for the program must take the test 300 times to achieve necessary proficiency. Because some people are naturally more adept than others, the equipment is set to each individual's level of skill.

The CTT allows the driver four chances to pass the test because even a trained, sober person can fail. After four failures, the driver must wait 10 minutes before the equipment will let him try again.

The unit in the trunk — sealed to prevent tampering by the driver — records every time the ignition was turned on, whether it was started, whether the driver took the test, whether he passed the test, whether he drove the vehicle, whether he went more than 10 mph, and when he turned off the ignition.



This is the experimental Drunken-Driving Warning System financed by a $450,000 federal grant

Under the bill, those chosen for the program would be volunteers convicted of a second drunken-driving offense. They would go into the program for six months instead of the usual punishment of jail or fine and license suspension. They would use DOT cars and would have to report to Systems Tech for a check of trip records every two weeks.

"There is no claim of therapy, no claim that this is remedial," Stein said. "The hope is that the program will eliminate drinking driver trips."

If the experimental program proves successful, it will prompt DOT to invest $5 to $15 million in further studies that may lead to an expanded program. Stein said California was chosen for the experiment because it has the most cars and has uniform laws on drinking drivers.

San Francisco Examiner, June 22, 1980

Los Angeles
Times, July 9, 1980

'Drunkmobile Bill'

Can you imagine the gall of our legislators? In the face of budget cuts involving valuable services I noted an article in The Times (July 2), "Drunkmobile Bill Gains in Senate."

This bill would authorize a federally financed experiment costing $450,000 and would finance 10 so-called "Drunkmobiles" in Los Angeles.

The bill would allow judges to waive jail terms and fines for repeat drunk drivers. I emphasize, repeat drunk drivers. It would allow that they be furnished with specially equipped cars that would blink their lights and their horns would beep if they were operated by a drunk driver.

I suggest that Assemblyman Herschel Rosenthal (D-Los Angeles), the bill's proponent, and all those who vote for this bill be equipped with such gear as to cause their lights to blink and their horns to beep so that all sane voters can stay clear of them on next election day.

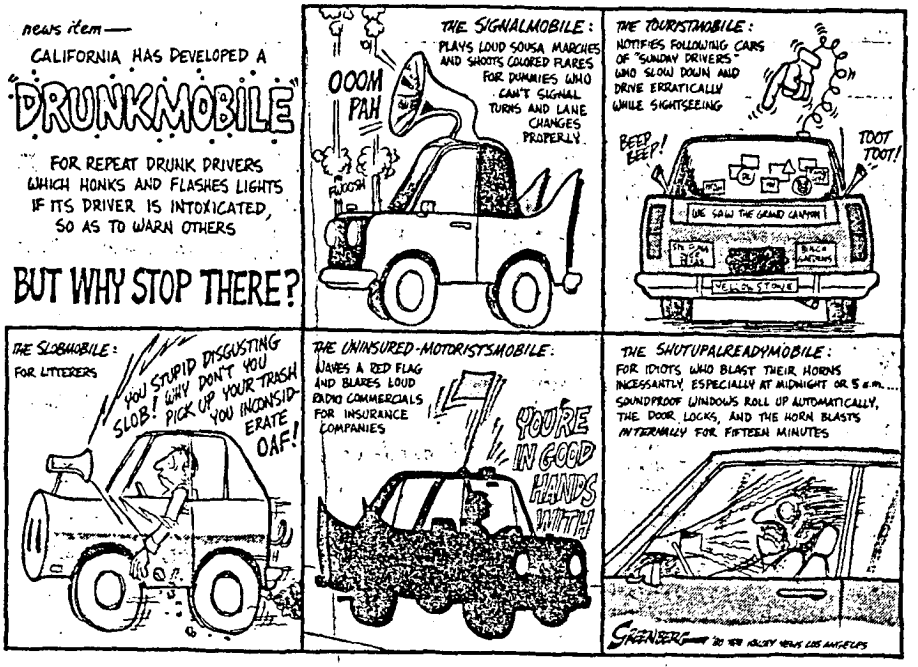
I can understand one drunk driver guilty verdict without severe penalties, but upon conviction of a second charge, the law should be strictly and uniformly enforced. Those who died or who were maimed by drunk drivers demand justice, not an expensive Rube Goldberg experiment.

MAURICE S. KLEIN
Los Angeles

I keep hearing, but not wanting to believe, that crime pays. Now I know it's a fact. If I am caught and convicted of drunk driving twice, I'll win a car loaded with $10,000 worth of extras!

Seriously, I can think of a far cheaper and far more effective way to eliminate drunken driving. First, take away the offender's license—for life. Second, sell his/her car. The money collected from this might help to alleviate the hospital bills that people who are injured and maimed by drunk drivers are forced to pay out of their own pocket.

JANE GRAY
Santa Monica



Honk, honk. Hic, hic

A limited number of twice-convicted drunken drivers would return to the highways in experimental "drunkmobiles" with flashing lights and honking horns if Gov. Edmund G. Brown Jr. signs legislation that has been sent to him.

The legislation, authored by Assemblyman Herschel Rosenthal, D-Los Angeles, may help warn motorists to get out of the way of these irresponsible motorists who run on their own version of gasohol.

But a report just released by the Department of Motor Vehicles indicates that a far more drastic approach may be needed in dealing with people who tank up on alcohol and then use their cars as dangerous missiles in search of victims.

DMV officials found that more than half the motorists whose driver's licenses have been suspended or revoked due to drunken driving convictions continue to drive anyway.

A department study showed that 65 percent of 1,111 such drivers surveyed admitted they drove while their licenses were suspended or revoked.

What appears to be needed is not for judges to sentence drunken drivers to cruise in a fleet of "drunkmobiles" but for the jurists to take away the mobility of these highway menaces.

If stripping drunken drivers of their licenses fails to keep them off the highways, as the DMV study would indicate, perhaps some time in jail would keep them from behind the wheel.

Certainly anyone who loaded a gun and ran down the street waving it would quickly end up in jail. A drunken driver is no less a danger to society, if the continuing stream of traffic fatalities and injuries is any indication.

Fines and special traffic classes and suspending or revoking licenses fail to stop such individuals from driving. We doubt that such penalties, if they can be called that, deter the drinking and driving pattern either.

If Assemblyman Rosenthal and his colleagues in Sacramento would pass a law requiring 10 days in jail for a first drunken driving conviction and considerably stiffer sentences thereafter, they might really accomplish something in terms of making the streets safer.

The certainty of a jail sentence might be the one thing that catches the attention of those drivers who like one, or more, for the road.

If such an approach seems too drastic for the Sacramento solons, some of whom have had their own alcohol-related driving problems, perhaps instead of providing cars with special horns and lights for the drunks they could provide vehicles for the protection of the non-drinking motorists. How about tanks?

San Fernando Valley News (Los Angeles County), date unknown

Daily Breeze Torrance, California Sun., July 20, 1980 B8

'Drunkmobile' may save lives

By Rich Connell
Staff writer

You can lead drunks to a judge, but you can't make them stop driving.

That dilemma, coupled with the 46,000 traffic deaths annually in the United States, more than half of them involving drinking drivers, has led to the development of the so-called "drunkmobile." It is now being tested by Hawthorne-based Systems Technology Inc.

Equipped with a sophisticated computer that detects when a driver's abilities are impaired, the vehicle flashes its emergency blinkers and beeps its horn if a drunk is at the wheel.

The tests are being conducted under a research grant from the U.S. Department of Transportation, which has been studying devices designed to stop drunks from driving for 10 years.

Earlier systems involved an interlock with the ignition that would prevent the car from being started if the driver did not pass a reflex test.

One such test involved a keyboard placed in the dashboard. If the driver was not able to quickly punch a number that appeared, the car would not start.

For a variety of reasons — including the liability problems associated with not being able to move a vehicle in a critical situation — the ignition interlock concept was abandoned.

The research turned to a warning system that would alert other drivers and police when a drunk was behind the wheel.

And the surviving system of that research is the drunkmobile.

Under a $450,000 federal grant, Systems Technology is midway through a three-year test of the vehicles.

The cars are typical 1978 compacts, except for a small device that looks like a tachometer mounted on the steering column.

The device is called a Critical Tracking Task, a unit developed by NASA for testing impairments of astronauts.

The test is like a computer game in that the driver has a specific time in which to "score" against increasingly difficult odds. A bouncing needle on a gauge must be kept within a small area by turning the steering wheel from side to side.

If the driver passes the test, the car may be driven normally. If the driver fails, he must wait 10 minutes to take it again. If the car is driven, the lights flash and the horn honks once speeds exceed 10 mph.

Tony Stein, a researcher with Systems Technology, said the test can be finely tuned to match each individual's ability. It has proven to be an accurate indicator of drunkenness, he said.

"It's a psycho-motor test and we are testing direct driving skills — eye-hand coordination, what you see and how you control the steering wheel.

"We know it works in the lab. But we don't know if it works in the field. Will it stop drunks from driving?"

Stein said research has shown drunk drivers — more than anything — want to avoid being noticed. "On the freeway, they'll lay one wheel right on the spot bumps and keep it there so they won't weave. So the question is, will the drunk drive with the lights flashing and the horn honking?"

The actual field test has not yet begun, partially because of state laws.

Systems Technology wants to use drivers who have been convicted twice of drunken driving. However, current state law requires that second offenders lose their licenses, or enroll in special drunken driving courses.

Assemblyman Hershcel Rosenthal, D-Los Angeles, has authored a bill that would permit 24 second offenders to be assigned to the field test.

The participants would be selected by traffic judges in West Los Angeles and Compton courts and given drunkmobiles to drive for six-month periods.

Gas, oil and insurance would have to be provided by the participants.

Those involved would be issued licenses good only for the test vehicles. They would be required to return to Systems Technology every week so researchers could check computer tapes in a sealed unit.

The tapes record the date and time of each test, whether the driver passed or failed, and whether the car was driven.

Elaborate measures have been taken to make sure no one else can take a test for the participant, Stein said.

The car door must be closed to take the test and it must be taken again each time the door is opened. Also, there is a switch in the driver's seat which is calibrated to the participant's weight.

The entire system — including the wiring, the computers, the lights — has special seals which must be broken to defeat the warning system.

"We've done everything we can think of to prevent the driver from getting around the system," Stein said.

Though no state funds are required for Rosenthal's bill, the measure has run into some resistance in Sacramento. Some legislators have criticized the project as a frivolous waste of money.

Assemblyman Bill McVittie, D-Chico, chairman of the Criminal Justice Committee, said nothing would prevent a convicted drunk driver from taking his private vehicle out when he is drinking.

Stein admits nothing in the system would prevent that, but he notes the driver would be risking a more serious penalty if caught violating probation.

"And if he still drinks, but gets his wife to drive or takes a taxi then that's fine. We've detered him from driving."

If the tests of the system prove successful with the 24 participants, then it is likely to lead to further refinement of the device and a test with a larger group of people.

It cost the government, which owns the patents on the systems, about $130,000 to develop the equipment for the 10 cars that will be used in the first test.

But the cost per unit could be reduced to as low as $600 if it goes into full production, Stein said.

Ultimately, judges might require convicted drunk drivers to place the unit on their vehicle in lieu of losing their licenses, Stein said.

And insurance companies might give convicted drunk drivers a break on insurance rates if they use one of the systems, he said.

Rosenthal said, "The question is, 'Will anything keep the drunk from driving?' If you take away his license, he drives anyway.

"Nothing we've been able to do so far has gotten through that muddled brain to say, 'I shouldn't be driving.' "

Car drunk-o-meter in your future?

Daily Breeze (Southwestern
Los Angeles County), July 23, 1980

By Robert P. Studer
Copley News Service

SACRAMENTO — The drunk comes staggering out of the bar and climbs behind the wheel of his car. He sits there for a minute, fiddling with the steering wheel, moving it back and forth as he watches a needle on a dial.

He swears in bleary-eyed exasperation and turns on the ignition, jamming the car in gear and backing angrily out of the parking space. But his trip is far from uneventful. He's dogged all the way by the flashing of his emergency lights and the blaring of his horn — beep . . . beep . . . beep — once every second. His passage can be heard long after he has swerved around the corner and disappeared.

Meanwhile, other motorists on the street are giving the apparition coming toward them wide berth. And it isn't long before a squad car pulls alongside and waves the fuzzy-brained fellow from the bar over to the curb.

No lives have been lost, no innocent victims maimed. Only a new peck of trouble for the fellow in the car with the blaring horn.

That, if legislation becomes law which so far has found favor in the Assembly, may become a real life scenario in the not too distant future on the streets of Los Angeles.

Applying space age technology to the age-old problem of society's drunks — at least to the extent that they endanger others behind the wheel of a car — the legislation calls for installation of a "drunk-o-meter" in the automobiles of 24 individuals in Los Angeles County who have been convicted of a second drunken driving charge. For the purposes of the test, all will be volunteers. They will be offered the alternative of going along with it rather than suffering the more customary consequences of their crime — jail, or suspension of their driver's license, or both.

Thus, as technology attempts to save them from themselves, their civil rights still will be protected.

The "Drunk Driver Warning System" consists of a meter with a centered needle indicator, which is attached to the steering column and connected to electronic sensors and a cassette recorder stored in the trunk of the car.

The meter measures driver performance in the critical task of "tracking" his vehicle. The concept first was developed in the 1960s to test how astronauts would function under adverse conditions of weightlessness and long confinement.

The driver, so goes the scenario, climbs into his car, closes the door and turns on the ignition in the usual way. The seat is adjusted for only his weight, so that no one else can take the test for him.

When the driver with the chronic drinking problem turns on the ignition, the car's hazard lights begin to flash. To turn them off — and to deactivate the circuit that would automatically turn on the car's horn to blow a loud blast once every second after the vehicle reaches 10 miles an hour — he must pass a dexterity test. He must watch the needle and keep it dead center for a few seconds by gently and rapidly turning the steering wheel to the left and right.

If he can satisfy the machine that he is sober, it'll let him drive in peace. Otherwise, his car will beep and flash the news of his condition to the world.

Supposedly, keeping the needle centered in the dial is easy — if you are sober. Still, candidates for the test would be required to practice it 300 times to make sure they have achieved the necessary proficiency. And, because some are more adept than others, the equipment is adjusted to reflect the individual's personal sober-level skill.

The legislation, AB 3482, by Assemblyman Herschel Rosenthal, D-Los Angeles, would authorize Los Angeles County courts to allow 24 second-offense drunken drivers to participate in such a program operated by Systems Technology Inc. of Hawthorne, under a $450,000 contract with the U.S. Department of Transportation's National Highway Traffic Safety Administration. The measure has already been approved by the Assembly Criminal Justice Committee.

Systems Technology, which has 10 1978 Chevrolets equipped with the Drunk Driver Warning Systems owned by the Department of Transportation, demonstrated to legislators that the drunk-o-meter would give the suspect driver four chances to pass the test — because "even a trained, sober person can fail."

After four failures, however, the driver must wait 10 minutes before the equipment will let him try it again.

Los Angeles Times, date unknown

Bill to Conduct Six-Month, $450,000 'Drunkmobile' Test Approved by Senate

By DOUGLAS SHUIT
Times Staff Writer

SACRAMENTO—A bill to conduct a test in Los Angeles of 10 cars known as "drunkmobiles" and specially equipped to detect drunk drivers cleared a final hurdle Wednesday.

The bill, authored by Democratic Assemblyman Herschel Rosenthal of Los Angeles, was approved by the Senate 23 to 4.

The bill now moves back to the Assembly, where it passed earlier in a lopsided vote, for approval of amendments tacked on by the Senate.

But Rosenthal said he expected no further roadblocks to the bill, either in the Assembly or when it reaches the governor's office.

"We hope this will cut down on the number of drunk drivers," Rosenthal said after the Senate vote. "We don't know whether it will work, but we do know that nothing else has worked. If it does anything to cut down on drunk driving it will be worth it."

Cars used in the test would be equipped with a special device that would trigger flashing lights if the driver fails an in-car sobriety test. If the car is then driven at 10 m.p.h. or more, the horn will beep every half-second.

The test will require the driver to keep a small needle within a limited range on a gauge attached to the steering wheel, something which supposedly cannot be done if the driver is drunk.

Special Lock Rejected

At one point, officials considered a special lock that would render the car inoperable if the driver failed the test. But that idea was rejected when law enforcement authorities objected because it would pose safety problems if the car could not be moved off roadways.

Rosenthal said he hoped the flashing taillights and parking lights and the honking horn will be enough of a deterrent to keep the driver from operating the so-called drunkmobiles.

"I'm not sure this will keep people from driving, but we'll see," Rosenthal said.

Rosenthal's bill would limit the test program to 24 twice-convicted drunk drivers who volunteer.

Currently when a driver receives his second drunk driving conviction he automatically loses his license, with certain exceptions.

Under Rosenthal's bill, those participating in the pilot program would be allowed to drive only those cars equipped with the test devices while serving a probationary sentence.

Drivers would pay the costs of operating the car—gasoline, maintenance and insurance—during the probationary period.

One of the Senate amendments calls for the issuing of special licenses to those participating in the program, restricting their driving to the test cars.

The other amendment would assure that law enforcement authorities could arrest participants if they are caught driving drunk even though they are participating in the program.

The pilot program will be funded by the U.S. Department of Transportation with a $450,000 grant to Systems Technology Inc. of Hawthorne. The tests on each of the 24 drivers will last six months.

Daily Breeze, September 26, 1980

Letters to the editor

Provide option for drunk drivers

Editor, The Daily Breeze:

As a researcher involved in the "drunkmobile" project, or as we prefer to call it, the Drunk Driving Warning System (DDWS), I feel compelled to correct the misconceptions expressed in the Sept. 19 Feature page article by Ron Roach.

First, Assemblyman Rosenthal's bill has no financial impact on the state budget and does not authorize any federal expenditures.

The money for this project (of which the field tests are only one part) comes from a contract awarded to Systems Technology Inc. in November 1978 by the U.S. Department of Transportation.

The $450,000 cost for this three-year project should also be placed in a proper perspective.

In California alone, the current annual cost associated with drinking-driving accidents is $8 billion.

Less than 1/1000 of 1 percent of this cost is a minute amount of money to spend on a major national crisis that accounts for 50 percent of all highway fatalities and injuries.

The second misconception concerns the current disposition of second-time drunk drivers.

In California, there are minimum and maximum fines, minimum and maximum jail sentences and a mandatory drivers license suspension for convicted second-offense drunk drivers.

There is currently an exception to these penalties, however.

If the individual successfully completes a one-year, state-approved treatment program, the minimum jail sentence is suspended and the individual is allowed to retain his/her drivers license.

It should be noted that short of lifetime prison sentences, no individual type of sentencing is 100 percent successful.

Individuals currently in treatment and those with suspended licenses are arrested on a daily basis for drunk driving.

The DDWS concept is a result of long-range, government-sponsored research to find methods that will reduce the drunk-driving problem at the expense of the offender rather than society.

Assemblyman Rosenthal's bill allows only 24 individuals to participate in the DDWS research in lieu of the previously mentioned sanctions.

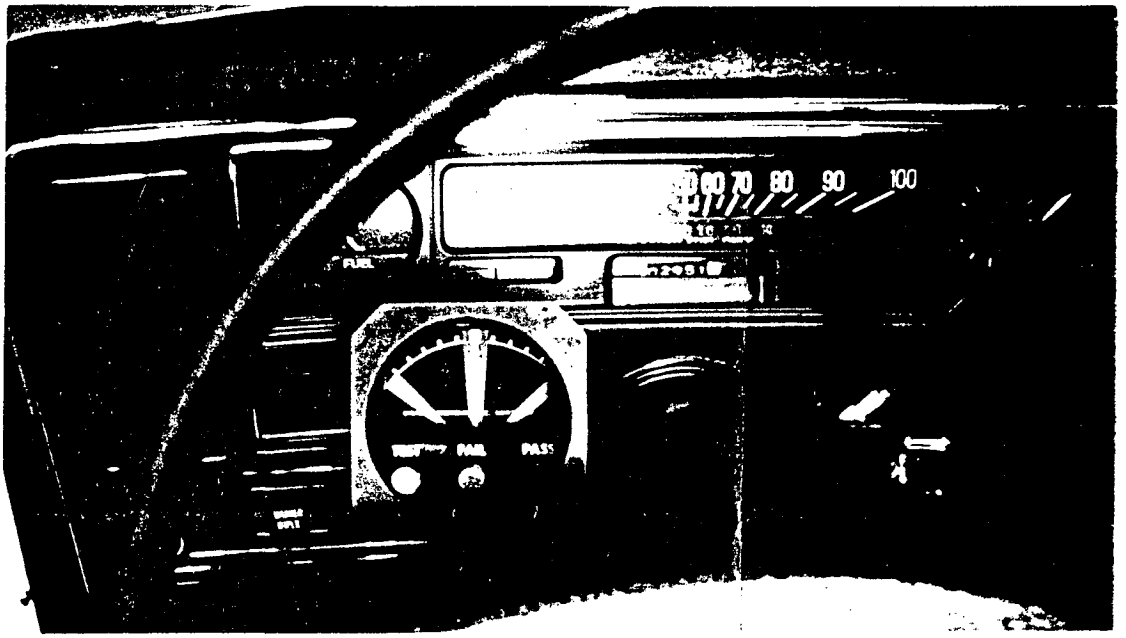
This will allow the testing of the feasibility of the DDWS concept.

If the DDWS proves to be a successful deterrent, it could result in an offending drunk driver having the option to equip his car (at his own expense) with a DDWS system rather than going to jail.

The DDWS is not intended as a frivolous, lenient sanction for drunk drivers — but is, in fact, a serious attempt to reduce the number of drunk drivers on the road and save innocent lives.

—ANTHONY C. STEIN
Staff Engineer and Psychologist
Systems Technology Inc.
Hawthorne

Alcohol sensor system warns of drunk drivers



Drunk Driving Warning System involves a device that measures eye/hand coordination and reaction time to behavioral tests to determine driver intoxication.

Hawthorne, CA—Hydroplaning is one hazard of driving. But driving on roads inundated with drunks presents the principal danger, according to design engineers responding to a *Design News* automotive survey.

One respondent suggested that work be started on an alcohol-sensing device installed in the general area of the driver's seat that would monitor the driver's breath and cut off the engine if the individual were intoxicated.

A number criticized courts for too casual treatment of drunk drivers. However, those faulting some courts for laissez-faire handling of drunk drivers may get help from research now being conducted in California by the National Highway Safety Traffic Administration (NHSTA), which is part of the Department of Transportation, to test the feasibility of the Drunk Driving Warning System (DDWS), more commonly known as the Drunkmobile. The three-year, $450,000 project was undertaken in November 1978 when Systems Technology, Inc. was awarded a NHSTA contract to produce an in-vehicle device based on a Critical Tracking Task (CTT) that warns the driver and others on the road of his/her perilous condition.

How does it work? A driver climbs into a car, closes the door and turns on the ignition that activates visual and audio alarms—flashing lights and honking horn—controlled by electronic sensors located in the trunk, along with a cassette recorder that keeps track of the driver's CTT performance. To deactivate the alarms, a driver must pass a behavioral test that measures eye/hand coordination and reaction time.

Adjacent to the steering wheel is a display unit that contains a meter with an indicator needle which the driver is required to keep centered for a preset number of seconds by turning the wheel as quickly as possible with small movements. Test difficulty is increased by forcing the driver to correct needle falloff at a faster and faster rate.

If one passes the test (one gets four chances because other impairments such as fatigue, drugs and psychological stress may cause failure), one may go and drive in good health. However, if one fails all four tests, one must wait 10 minutes before trying again to pass it. If the driver gives up, he or she may speed off, anyway—but accompanied by continuous emergency flashers and a trumpeting horn that honks once per second when the auto exceeds 10 mph.

According to Anthony C. Stein, a Systems Technology engineer and psychologist, the needle-tracking task system was developed in the early '60s for NASA to test maneuvering controlability of astronauts under weightless and long confinement conditions. Other in-vehicle test devices to determine sobriety followed, but were rejected because of poor operational viability.

One of the more successful devices was GM's Phys Tester that entailed a display of numbers or letters on the dashboard and computer-prompting of drivers to repeat what was seen on the screen—e.g., 5-31-2-47-9 or H-Z-K-E-Q-T before starting a car. The motorist was given three chances to successfully follow computer instructions. If she or he failed, the system locked the ignition.

"When first conceived," Stein explains, "everyone assumed the interlock system would be installed in all cars. But aside from people objecting to interlock devices, such as unfastened seat belts preventing car movement, there was the matter of liability problems arising from inability to move a vehicle in emergency situations such as a drunk driver faced with the critical necessity of transporting a sick child to a hospital.

"Further, the system was sensitive to things other than alcohol, like the type of job held (a keyboard operator could perform the task even if drunk), and literacy problems of people who have right or left side brain dominance and tend to transpose numbers or letters.

"Thus, in 1976 NHSTA changed the concept to one of a warning rather than interlock system, with countermeasures incorporated to circumvent cheating. These include sealing components and cables that must be broken to turn off the flashers and horn, and a switch in the driver's seat is calibrated to the driver's weight so that no one else can take the test for him or her."

Drunkmobile testing in ten 1978 Chevy compacts equipped with DDWS involves 20 second-offense drivers who are required to return frequently to Systems Technology for computer checks of cassette tape data. The federal government picked up the $130,000 tab for the equipment, but estimates that the cost can be slashed to $600 when the units go into full production if results of the test, scheduled for release in the first quarter of 1982, prove the concept to be feasible. Drivers are tested for a six-month period in this replacement transportation for their own cars.

"California law is unique," says Stein. "There's uniform treatment of drunk drivers specified in the vehicle code. Depending on the offense, sentencing ranges from 48 hours to one year in jail, and a fine of $250 to $1000, with revocation of a license for one year.

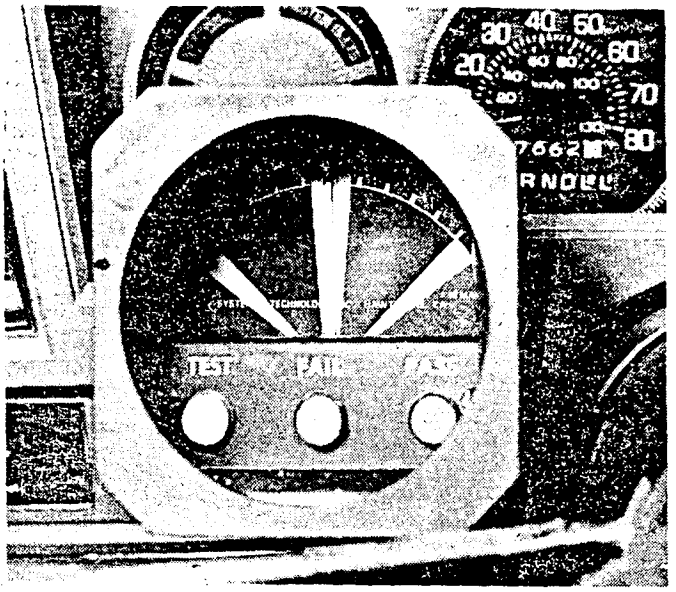
"Because recidivists are central to the test, a bill was enacted that calls for alcohol abuse treatment programs paid for by the offenders. If they opt for treatment and test participation, jail time is canceled and licenses may be kept. Drivers pay for gas, oil and maintenance of the DDWS cars.

The system is sensitive to alcohol levels as low as .05% blood alcohol concentration, which is one-half the level defined as the legal limit for drunk driving in the U.S.

"Placed in perspective," Stein points out, "the $450,000 cost for the three-year remedial, not rehabilitative, program is minimal in terms of the annual cost of $8 billion to California alone for drunk driving accidents." □

Newsday,
December 22,
1980, page 3

A driver fails the test when indicator, shown in upright position, hits triangular areas, left and right.



Device Flags Driver Who's Drunk

By Bob Wacker

Washington—With the confidence of a typical drunk, I slid behind the wheel of the test car, turned on the ignition and stared at the dial on the steering column.

I had to concentrate on it. Slowly, the white needle on its face slid rightward, from a green center strip toward the forbidden red zone at the end of its arc.

Correcting, I turned the steering wheel to the left. The needle reversed, but too fast. Now the needle slipped faster toward the red zone at the left.

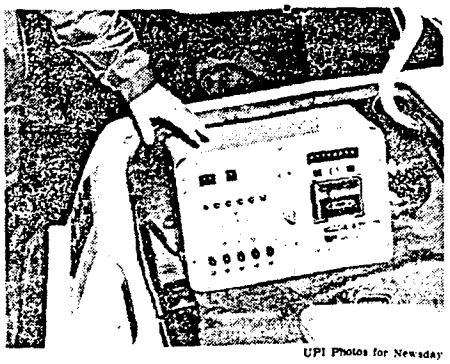
I spun the wheel to the right. The needle reversed again, faster still. I couldn't catch it. It plopped into the red zone at the right.

A bulb lit up underneath the word FAIL. The needle returned to rest in the green center zone. The car had decided I was too drunk to drive safely.

* * *

"That makes five times in a row you've failed, and we've got it at the easiest setting," said P. Robert Knaff, director of the Office of Driver and Pedestrian Research of the U.S. Transportation Department. The tall, spare scientist was unable to conceal his satisfaction. An hour and a half ago, while sober, I had passed that same test in the Washington, D.C., Transportation Department parking garage, at almost the hardest instrument setting. "I can do this anytime, drunk or sober," I had boasted.

Reluctantly, Knaff accepted my challenge for an unscientific test of a device that may keep drunks from driving, or, if they insist, will certainly call attention to them. The dial, about 2 inches in diameter, is tied into a car's light and horn system. If the driver cannot hold the needle in the "safe" green center zone for 10 to 30 seconds, the four-way hazard lights will flash continually. If the speed exceeds 10 MPH, the horn will blow once each second. And a computer in the trunk will record that fact.



UPI Photos for Newsday

Computer linked to test device records failed tests and times the car was driven despite a failure.

The device, which measures a driver's visual perception, hand-to-brain coordination and reaction time, will be tested in California in a $500,000 Transportation Department program starting Jan 5. It has been installed in 10 cars to be loaned to persons who have been convicted at least twice of driving while intoxicated. Participants in these tests will spend three days working the device so their normal perfomance levels can be determined. Then each device can be custom-set to their normal performance levels.

After I controlled the needle sober (a green light blinks a cheery PASS if the needle stays out of the red for 10 to 30 seconds), I started to drink. I downed nine ounces of 86-proof bourbon in an hour and a quarter, achieving a reading of .16 on a Washington Police Department Breathalyzer. This is about the average blood-alcohol level detected in all Long Island arrests in which Breathalyzers were used last year. I certainly did not feel incapacitated. But Suffolk Police Inspector David Daniels, head of the Highway Patrol, who accompanied me, said my uncertain gait, slurred speech and glassy eyes would have given any officer justification to make a driving-while-intoxicated arrest had I been driving.

I slid with drunken confidence behind the wheel of the test car. I started the engine so the power steering would free the wheel, allowing me to operate the testing device. Then I pushed the start button, and the yellow TEST light went on.

The needle that had been so cooperative when I was sober now was as skittish as a saucerful of tomato soup being carried across an Aubusson rug. As the soup might glide up one lip, then back too far and too fast as the saucer is tilted the other way, so the needle would swing, more and more wildly, till I flunked. And again and again.

Daniels, like other Long Island police officers, earlier expressed distrust of the device because, he said, "a real professional drunk could learn to beat it." Later, he conceded that it was more sophisticated than he had anticipated and that it might be a big help in taking drunks out from behind the wheel.

If I were in the test group, a computer in the trunk would have been recording miles driven, the number of tests failed and the times the car was driven in defiance of a failure. The tapes would be collected and analyzed every few weeks. A weight sensor in the driver's seat would prevent someone from passing the test and then making room for his drunk friend. Any time the seat is unoccupied, the engine would turn itself off and have to be started again.

If it works for the first 20 offenders, Knaff said, "we may expand the test to 100 or 200 next. We can't tell now. This is a research and development project." If the program went into wide use, the offendor would be expected to pay about $500 to have the device installed in his car and would be issued a special driver's license good only in that car. "We've got to see what the problems are before we decide what to do next," he said.

Los Angeles Times, January 22, 1982

Postscript:

Drunkmobile Put to Test on L.A. Streets

Ever the pacesetter, Los Angeles became the first city in the nation to have drunkmobiles on its roads early in 1981.

Assemblyman Herschel Rosenthal (D-Los Angeles) sponsored a bill that allowed judges in the area to waive jail terms for repeat drunk drivers and instead put them at the helm of cars that beep and blink when piloted by drunks.

The 10 cars—which look like ordinary 1978 Chevrolet Novas from the outside—were equipped by Systems Technology Inc. of Hawthorne as part of a $450,000 federally funded research project.

Tony Stein of Systems Technology terms the initial results "promising." He said five people have completed six-month terms in a drunkmobile and five others are currently driving one. Only one participant has been pulled over by police—for making an illegal left turn (while sober).

Before putting a drunkmobile into motion, the driver must balance an unstable needle in a small gauge near the dashboard for 10 to 30 seconds.

If the driver flunks, the car can still be operated. However, the hazard lights will blink and, at 10 m.p.h., the horn begins to sound off once per second, making it noticeable, even on the Harbor Freeway.

Some participants have flunked the car's Critical Task Tester, as Systems Technology calls it. Stein said one man reported stepping outside his house during a party to take the test out of curiosity (he failed it and went back inside).

But no one has attempted to drive after flunking, Stein said. The cars are equipped with computers that can record such occurrences, as well as other safeguards. (A weight sensor can detect if the driver and passenger switch seats after the test has been administered, for instance, nullifying the test.)

Stein said: "We would never claim it (the drunk warning system) would rehabilitate someone with a drinking problem." The goal was simply to learn whether people would be deterred from driving a drunkmobile while inebriated.

Municipal Court Judge Sherman W. Smith Jr. speculated that some day "car manufacturers might be required to install such a system."

Stein added: "It might be noted on a person's driver's license (that he can only drive a drunkmobile), in the same way some drivers are required to wear glasses. . . . Certainly jail sentences and revoked licenses haven't worked as deterrents."

Drunkmobile drivers have motored about unnoticed for the most part. However, Stein admitted that "one driver said he got some dirty looks from other drivers who were waiting for him to leave his parking place while he was taking the test." —STEVE HARVEY

BEN OLENDER / Los Angeles

Driver's left hand indicates gauge with needle to be balan

TR-1136-1-II

C-13

Courts Using Space-Age Gadget To Keep Drunks From Driving

A NASA-developed device for testing astronauts is helping keep drunk drivers off the road.

The test is now being used experimentally on convicted drunk drivers in California who volunteer for it in place of a fine and jail sentence. And it's a rousing success.

By ROGER CAPPETTINI

Here is how it works:

When a person gets behind the wheel, he must first take a test with the device, which is mounted to the steering column.

The device looks like a gauge with a needle pointing straight up. When the test begins, the needle falls either left or right, then back in the other direction. By turning the steering wheel back and forth, the driver tries to keep the needle pointing up.

"The more you drink, the more difficult it is to pass," said Dr. Monroe Snyder, Ph.D., of the National Highway Traffic Safety Administration. "If the driver drives the car without taking or passing the test, the car's four-way flashers go on. And if he drives more than 10 m.p.h., the horn honks once every second. That will alert other people — and the police — to the danger."

What's more, a device in the trunk records when the car was started, whether or not the driver passed the test, if the car was driven after failing the test and if it traveled over 10 m.p.h. That information is studied by court officers every two weeks. The driver is hauled back into court if he's been drunk behind the wheel again.

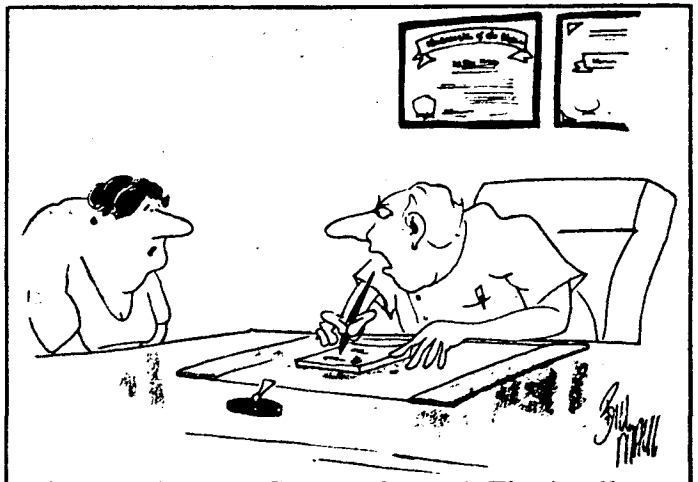
The judge then decides whether to allow the driver to continue with the program or levy a more conventional penalty — up to 18 months in jail plus a maximum $2,000 fine and revocation or five years suspension of driving privileges.

NASA developed the testing device about 20 years ago to measure astronauts' ability to perform tasks while weightless.

But in its new, down-to-earth assignment, the device "is a rousing success!" said Compton, Calif., Judge G. Tom Thompson. "It seems to discourage even those who would have an inclination to violate the law."

During the experimental period in two California court districts, subjects are being given a device-equipped car to drive during their six-month probation.

But officials hope someday to have the device installed in convicted drunk drivers' own cars.



"Getting better! Getting better! That's all you people think about! . . . Never mind that I'd be out of a swell job!"

NATIONAL ENQUIRER

NATIONAL ENQUIRER

January 4, 1983, Vol. 57, No. 22
EDITOR: Iain Calder

National Enquirer, January 4, 1983

Editorial spot
presented on
KABC-TV
(Los Angeles)

EDITORIAL #E96-80

"DRUNKMOBILE DRIVING"

EDITORIAL

Los Angeles County may soon become an accessory to a program that should give a new dimension to dim-witted doings.

Under a bill by local Assemblyman Herschel Rosenthal, ten so-called "drunkmobiles" will be issued to second-time drunk driving offenders selected by the courts. To start the cars, drivers must pass a computerized sobriety test. If they fail, lights flash and,..if the car is driven over ten miles an hour,..the horn honks every half-second.

The idea is to let other drivers,..and the law,..know that a drunk is approaching. Of course, that doesn't happen if he or she simply has a more sober friend start the car -- and when you come right down to it, it's the driving that's dangerous,..not the starting of the car.

Designed by a local technology firm and based on a NASA concept for studying astronaut weightlessness, the drunkmobile is a $450,000 pilot project. County money doesn't pay for it, but Federal dollars do...and we, the taxpayers, pick up the tab, no matter how it's labeled.

If Assemblyman Rosenthal is serious about keeping drunks off the road and preventing accidents, we have a novel suggestion. Why don't he and his legislative cohorts pass a bill setting a .10 blood alcohol content as evidence of drunk driving?

Many other states have already done so,..but every time it's been proposed in Sacramento, our California lawmakers quickly kill it.

I'm Gene Webster. We'd appreciate your comments.

The above editorial was telecast on October 9, 10 and 11, 1980, and was presented by Gene Webster, Editorial Director.

KABC-TV regularly presents editorials on topics of public interest which are delivered by Vice President and General Manager, John C. Severino. Your comments on these editorials are appreciated and the station welcomes requests for broadcast time from responsible representatives of contrasting views.

Gene Webster
Editorial Director

AN ABC OWNED TELEVISION STATION

TR-1136-1-II

In a recent editorial Channel 7 inferred that a new Los Angeles County pilot program was a waste. Here speaking in rebuttal is Anthony C. Stein, Staff Engineer and Psychologist for the contractor of the project.

REBUTTAL #R38-80

"DRUNKMOBILE DRIVING"

EDITORIAL

REBUTTAL

In a recent editorial, KABC-TV took a position against the drunkmobile research project.

Channel 7 points out that it is driving the vehicle while impaired that presents a danger. The drunkmobile system requires the driver to pass a test before driving. If the driver fails the test, or fails to take the test, driving the vehicle will cause activation of the alarms. Numerous safeguards have been incorporated to insure the person taking the test is the person who drives the car.

The $450,000 cost of this project should be placed in perspective. In 1979, alcohol-involved accidents cost Californians 2,500 lives and over $4 BILLION. Less than 1% of this cost is a minute amount to spend on a national crisis that accounts for 50% of all highway traffic fatalities and injuries.

A conviction for drunk driving can only happen after a person is arrested. Our research is designed to determine if this system will prevent the drunk driving incident. It is not intended as a frivolous or lenient sanction, but is in fact a serious attempt to reduce the number of drunk drivers on the road, and save innocent lives.

KABC-TV regularly presents editorials on topics of vital interest to its viewers. Clearly labeled as opinion, these television editorials are delivered by KABC-TV Vice President and General Manager, John C. Severino.
Rebuttal time is offered to spokesmen for recognized groups holding opposing viewpoints. Your comments concerning this rebuttal will be greatly appreciated.

Gene Webster
Editorial Director

The above rebuttal was telecast on November 9, 10 and 11, 1980.

APPENDIX D

OVERALL TEST DESIGN FOR THE FIELD EVALUATION

A. INTRODUCTION

This appendix provides a summary of the field evaluation design and procedures. Both overview and detailed flow charts are provided. These charts reflect the processes involved in selection of subjects and conduct of the field tests. Subject selection and experimental design are treated separately in more detail in Appendices E and F respectively. Data analysis is discussed separately in Appendix G.

Judge Hiroshi Fujisaki of the West Los Angeles (WLA) Municipal Court and Judge G. Tom Thompson of the Compton Municipal Court, both in the Los Angeles County Judicial District, participated in the development of these procedures and gave their full approval for application in their courts.

B. OVERALL FLOW CHART FOR FIELD TEST (FIGURE D-1)

The Overall Flow Chart shows the sequential movement of a subject from time of arrest to completion of the experiment. The data analysis portion of the experiment is shown in a dashed box as it is part of the data flow which follows the same path as the subject flow. Each step in the process has been numbered for clarity (e.g., "Eligibility Determination" is No. 1).

The succeeding flow charts will breakdown each process in Fig. D-1 into several subprocesses.

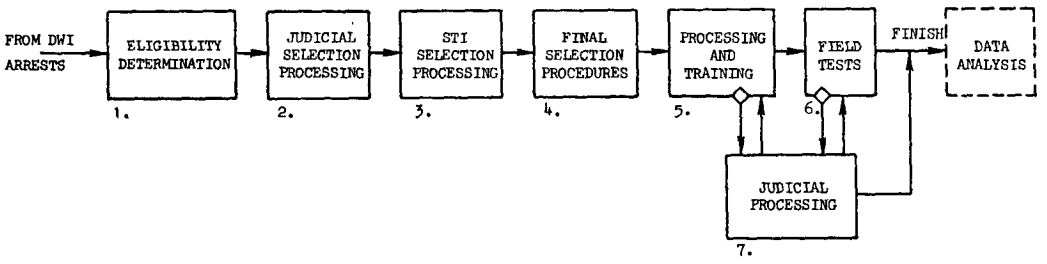


Figure D-1. Overall Flow Chart

More detailed explanations of the processes are found in subsequent appendices concerning subject selection, field test design, and data analysis.

C. ELIGIBILITY DETERMINATION (FIGURE D-2)

DWI subject eligibility for the DDWS program was determined by this process. If eligible the person proceeded to the next process; if not, he or she was handled by the courts in a normal manner. Decision 1.2 was necessary because the California law allowing this research (Appendix B) requires 1, and only 1, conviction of DWI. The judges required Decision 1.3 because defense lawyers will not allow their clients to go through processing prior to entering a plea.

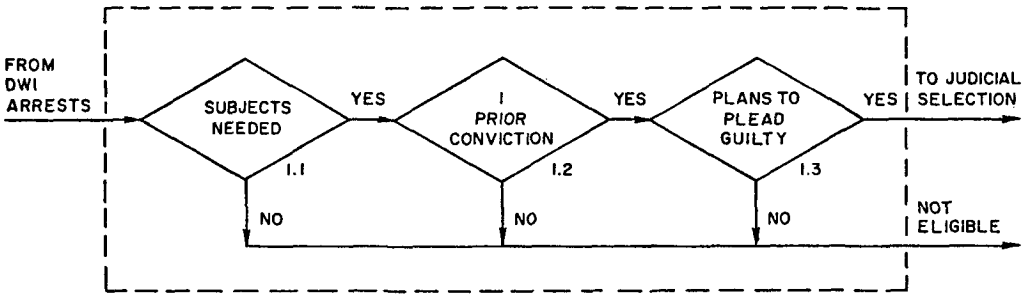


Figure D-2. Eligibility Determination

D. JUDICIAL SELECTION PROCEDURES (FIGURE D-3)

At this point eligible applicants were screened by the judge to determine their suitability. If they met all requirements for participation, and were typical of a defendant that the judge viewed as appropriate for the DDWS sanction, they proceeded to the next process. Decision 2.2 was needed to insure that the subjects could attend biweekly check-ins at STI. Decision 2.3 was needed to insure that there would be adequate data for analysis. Decision 2.4, "Socially responsible," was a value judgement by the judge (in the WLA court a public health officer was used to screen DWIs and recommend sanctions). Social responsibility would include such things as driving with a valid driver's license and

liability insurance; community stability; and a stable work history. If not selected the defendant was channeled through normal court processing.

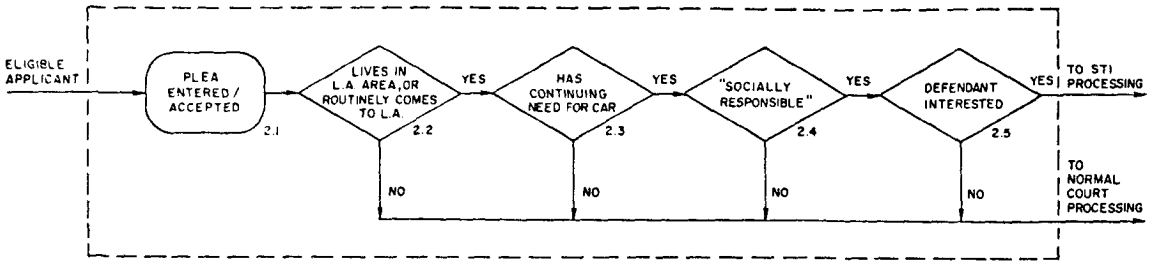


Figure D-3. Judicial Selection Processing

E. STI SELECTION PROCESSING (FIGURE D-4)

This process was used to eliminate high risk individuals: e.g., DWIs with extreme alcohol or drug problems; those who would be likely to tamper with the equipment; and those who indicated severe emotional or mental instability. Individuals eliminated by this process were handled by the court in a normal manner. Applicants who passed through this process proceeded to Final Selection Procedures.

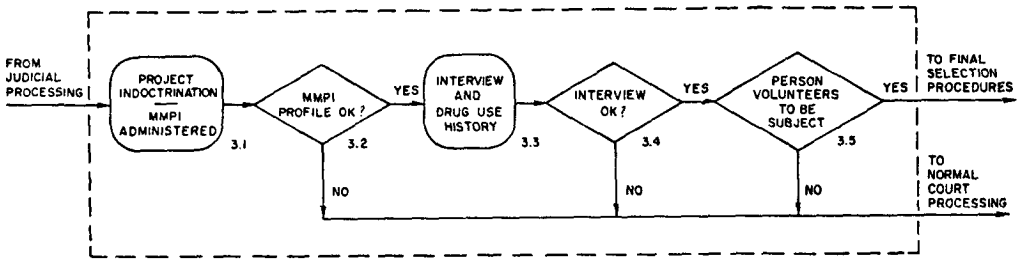


Figure D-4. STI Selection Processing

F. FINAL SELECTION PROCEDURES (FIGURE D-5)

In this process the subject's probation was imposed, and any remaining paperwork was completed.

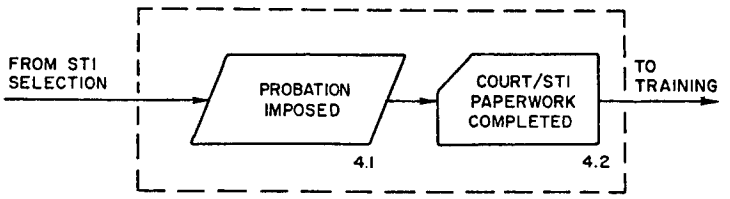


Figure D-5. Final Selection Procedures

G. PROCESSING AND TRAINING (FIGURE D-6)

Once selected as a subject, it was then necessary to determine that the DWIs driver's license had been restricted and the person had obtained liability insurance. The DDWS car was then assigned to the subject, and initial training began. The subject completed three training sessions. During training the DDWS task was turned on with the alarms deactivated and a period of in-vehicle training occurred. Following this, the CTT pass level was set, and the alarms were activated.

If the subject did not comply with the rules of the program, he or she was returned to court where the judge decided what further action would be taken.

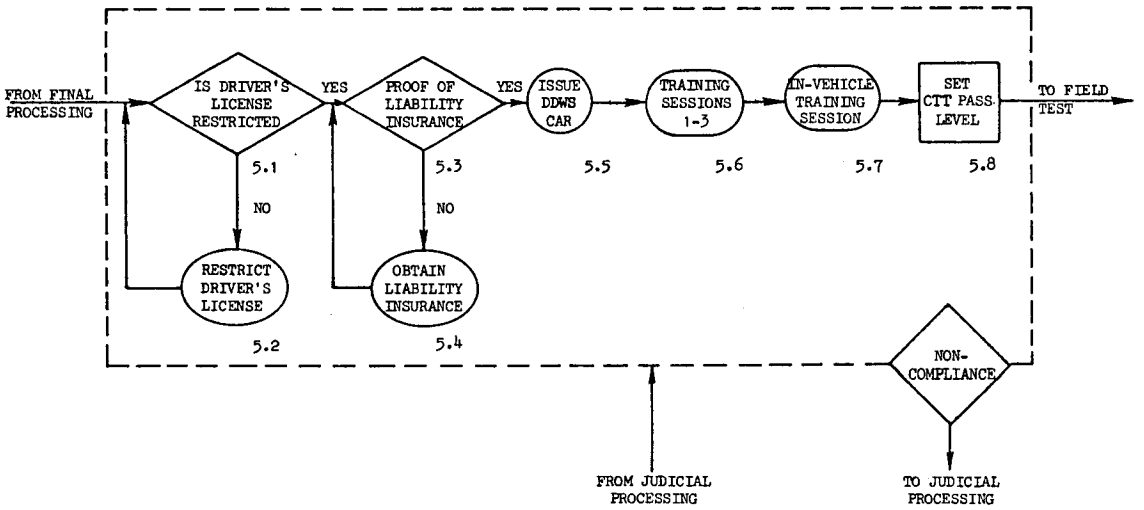


Figure D-6. Processing and Training

H. FIELD TESTS (FIGURE D-7)

Once trained, the subjects began operation of the DDWS vehicle as replacement transportation. Biweekly probationary check-ins were required where data was retrieved and the system was checked for signs of tampering. During the first two weeks of the final four weeks of operation the alarms were again turned off to look for changes in driving pattern. Following this, the DDWS system was deactivated for the final two weeks, again to determine any change in driving patterns.

In the event of tampering with the equipment, or other forms of probation violation, the subjects were returned to court for case review and disposition.

I. JUDICIAL PROCESSING (FIGURE D-8)

In the case of noncompliance in either training or the field tests, the subject was returned to court for a review of the case. The judge would then decide the disposition of the subject on an individual basis.

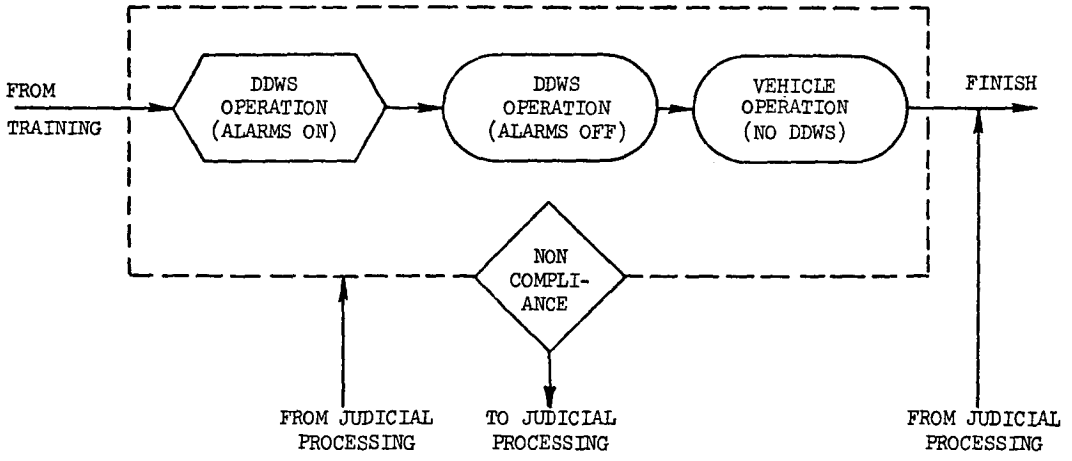


Figure D-7. Field Tests

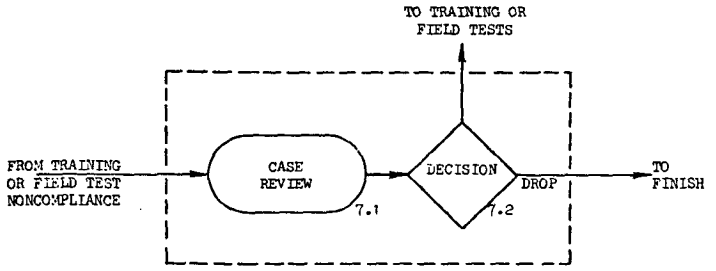


Figure D-8. Judicial Processing

APPENDIX E

SUBJECT SELECTION PROCEDURES

A. INTRODUCTION

This appendix reviews in detail the basic subject selection criteria for both the judiciary and Systems Technology, Inc. (STI) to obtain subjects for the field test portion of the project. Included are sections on eligibility determination, judicial selection procedures, and STI selection procedures. This appendix was prepared in cooperation with Judge Hiroshi Fujisaki of the West Los Angeles Municipal Court and Judge G. Tom Thompson of the Compton Municipal Court.

Four areas are explained in subsequent articles of this appendix: B - Eligibility Determination; C - Judicial Selection Procedures; D - STI Selection Procedures; and E - Final Selection Procedures. Each section begins with a flow chart providing a graphic description of the process followed by a narrative description. Several exhibits at the end of this appendix document transmittal forms.

B. ELIGIBILITY DETERMINATION

Prospective subjects were screened from the population of those individuals arrested for violation of Section 23102(a) of the California State Vehicle Code* (Drunk Driving) and appearing in the West Los Angeles or Compton Municipal Courts, and convicted by plea.

Eligibility required an existing need for subjects. The prospective subjects must have received a prior 23102(a) C.V.C. conviction within the preceding 5 years. Should these conditions not coexist, the prospective subject is processed through normal court procedures. Eligible potential subjects then undergo judicial selection procedures.

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*23102 (a). It is unlawful for any person who is under the influence of intoxicating liquor, or under the combined influence of intoxicating liquor and any drug, to drive a vehicle upon any highway.

C. JUDICIAL SELECTION PROCEDURES

The judicial selection process was left to the discretion of the individual judges. For the purposes of this research some additional criteria were added to facilitate applicant processing. Once the defendant had entered a guilty plea, it was determined whether he/she lives in, or routinely comes to, the Los Angeles area, because of the requirement for a probationary check-in every two weeks.

Following the "residence" determination, the judge determined whether the defendant had a "continuing need" for a car. The limited test duration for each subject would severely hamper any results if the vehicle was only driven once or twice a week.

The judge then determined if the person was "socially responsible." The judges weighed each case on its own merits. Some of the factors used in this decision included such things as having automobile insurance; driving with a valid driver's license; a stable work history; having a clean arrest record (with the exception of the prior DWI); and having some community stability.

The final decision in this selection involved the prospective subject. The judge presented a brief overview of the project and its requirements, and offered the person an opportunity to go through further screening. If the defendant was interested, the judge continued the case and had him/her contact STI within 48 hours for further screening. (See transmittal forms in Exhibit 1 at the end of this appendix.)

In all cases above, subjects not meeting the above conditions proceeded through normal court procedures.

D. STI SCREENING PROCEDURES

After passing the judicial selection procedures the applicant was directed to STI for further screening. The first step at STI was a thorough indoctrination of the applicant to project requirements. This included an explanation of the probationary conditions (Exhibit 2),

applicant orientation (Exhibit 3), review of the STI rules for participation in the program (Exhibit 4), and administration of the Minnesota Multiphasic Personality Inventory (MMPI).

The MMPI was used to screen out those individuals who had personality profiles that indicated tendencies toward aggression under alcohol, or severe emotional problems. Individuals with any of the above profiles were returned to the court for normal court processing. Those with severe emotional problems would have been informed of the local Community Health Center's location and the Center's ability to help them deal with their problem.

Individuals with "normal" MMPI profiles were then interviewed to determine their willingness to participate in the project. A drug use history was also obtained at this time. These interviews were used to help eliminate applicants who might be likely to tamper with the equipment or ignore the probationary conditions. The interview, in conjunction with the MMPI profile and drug use history, was used to eliminate individuals who were chronic alcoholics or drug abusers.

It should be pointed out that the legal blood alcohol concentration (BAC) limit in California is 0.10 percent. However, because the California law was presumptive rather than per se prior to 1982, most arrests in the 0.10 percent to 0.15 percent range were plea bargained to a lesser charge of reckless driving. Because of this we anticipated that the majority of our applicant pool would have arrest BAC levels greater than 0.15 percent.

Defendants who appeared likely to abuse the equipment were returned to the court for normal processing. Those who appeared to have chronic alcohol or drug problems were returned to the court with a recommendation that the court determine the suitability as a candidate for treatment.

Defendants who "passed" the STI selection procedures were asked if they wished to volunteer for the project. Those who did proceeded to final selection procedures; those who decided to not participate were returned to court for normal processing. (See transmittal forms in Exhibit 1 to this appendix.)

E. FINAL SELECTION PROCEDURES

After selection, volunteers returned to court. The judge then imposed as conditions of probation the rules and conditions contained in Exhibits 2 and 4. (A legal opinion on the validity of the Exhibit 4 conditions of probation is given in Exhibit 5.) The defendant then completed any remaining paperwork required by either the court or STI.

EXHIBITS

EXHIBIT 1. TRANSMITTAL FORMS

Defendant _____

You have been selected as a possible subject for the Drunk Driving Warning System research project. You are to contact Marcia Cook at Systems Technology, Inc. (Phone 213/679-2281) no later than 5:00 P.M., on _____ (date). You are to return to this court on or prior _____ (date), with a letter from STI.

To: Judge Fujisaki/Judge Thompson

From: Systems Technology, Inc.

Re: _____, Defendant

_____The Defendant has been found an acceptable candidate for participating in the DDWS research project. The Defendant will be assigned to the following vehicle:

1978 Chevrolet Nova
License Number _____
VIN _____

Please have him/her report to STI for Rules and Conditions at _____ (time)
on _____ (date).

_____The Defendant is not acceptable for participation in the DDWS research project at this time. We [___ do; ____ do not] suggest you have him/her evaluated for participation in a treatment program.

Defendant _____

You have been selected to participate in the Drunk Driving Warning System research project. Report to Systems Technology, Inc., at _____ (time) on _____ (date) for orientation. You will be directed where to go to have your driver's license restricted; and if you need assistance in obtaining insurance you will be helped.

You are reminded that the Rules and Conditions stated by STI are a part of your probation. Any violation of these rules will cause you to be sent back to this court for an evaluation of the circumstances surrounding the violation. If you are found in violation of probation, your probation can be revoked and you can be resentenced up to the maximum allowed by law.

EXHIBIT 2. CONDITIONS OF PROBATION

People vs. _____ Case No. _____ Date _____

Defendant is on court with _____ Counsel _____

All parties stipulate that Commissioner may hear this matter and impose judgment..... _____

Imposition of sentence is suspended; defendant is placed on summary probation for 24 months on the following terms and conditions:

1) Pay a fine of $_____ plus PA; with a credit of $_____. Stay on payment of fine until..... _____

2) Participate in the Drunk Driver Warning System research project conducted by Systems Technology, Inc. (STI), pursuant to 23102, V.C., amended 1980 Statutes, Chapter 1377.

3) Report to STI for training and subsequent check-in, as directed by STI.

4) Obey all rules and conditions of STI in conjunction with the research project.

5) Driver's license and privilege to drive is restricted to the use of a 1978 Chevrolet Nova, California license plate number _____, VIN _____, for the period commencing _____ and ending ..... _____

6) Defendant is to provide liability insurance for the above vehicle for the period of driver's license restriction, and is to provide proof of such insurance to STI prior to..... _____

7) Defendant is ordered to permit no one other than himself to drive the vehicle described in Condition 5 above.

8) Defendant is to obey all laws, rules, and orders of the court.

9) Defendant is not to commit the same or similar offences.

10) Defendant is not to drive a motor vehicle without a valid California driver's license in his/her possession. Defendant is reminded that in accordance with Condition 5, his/her driver's license is restricted and is not valid for use with any other motor vehicle.

11) Defendant is not to drive a motor vehicle unless six (6) or more hours have passed since the consumption of any alcoholic beverage.

12) Defendant is not to drive a motor vehicle without automobile insurance for personal liability and property damage.

13) If stopped while driving a motor vehicle, defendant is not to refuse to submit to a blood, breath, or urine test offered by any peace officer.

14) Defendant is advised that the DDWS is a machine, and as such, is not 100 percent foolproof. Defendant is also advised of Condition 11 stating that he/she is not to operate a motor vehicle unless six (6) or more hours have passed since consumption of any alcoholic beverage.

15) Defendant is informed that passing or failing the DDWS test in no way implies an ability to operate a motor vehicle; that the passing or failing of the test cannot be used as evidence to prove either guilt or innocence in a court of law.

16) Defendant's signature below indicates that he/she fully understands and accepts the conditions of probation listed above, and that he/she has received a copy of the conditions.

_____ _____

Defendant Date

_____ _____

Witness Date

EXHIBIT 3. INTRODUCTION TO APPLICANT

You have been selected by the court as a possible subject in a research project for testing the possible use of the Drunk Driving Warning System (DDWS) as a means of stopping people from driving after they have been drinking. The Drunk Driving Warning System is a device that is mounted on the steering column of a car. It requires that you take a brief test before you drive the car. If you pass the test, the car operates normally; if you fail the test, but drive the car anyway, the alarms will alert other motorists, as well as the police, that you should not be driving the car. When triggered by your failure to pass the test, the alarm system will cause the 4-way emergency flashers to blink and, if you drive over 10 miles per hour, it will cause the horn to honk once every second. If you don't take the test the system will operate as if you have failed.

Because of the seriousness of your offense, and because your participation in this project will allow you to keep your driver's license, there are certain requirements that you will have to meet to be accepted as a subject. You will first be given a personality inventory that will give us some basic information about you. Following this, you will be interviewed by one of our staff members. You will be asked about your drinking habits, and (other) drug use, and some other questions of a personal nature.

If you meet the requirements of the project, you will be given a chance to volunteer to participate. If you do not meet the requirements, or if you do not volunteer to participate in the project, you will be sent back to court. You should be aware that the judge will not view your return with any bad feelings, and that you will be treated exactly as you would have been if you had not come here today. Please volunteer to be a part of this project only if you want to.

Before making a decision about participating in the project you need to be aware of the possible alternatives the judge has in sentencing you, and of the penalties involved in each alternative.

Alternative 1. Penalties for a second offense of Driving Under the Influence.

A) Pay a fine of $355 minimum to $1,000 maximum. A penalty assessment of $3 will be added to each $10 of your fine, plus an additional $5. (A fine of $355 means that you will have to pay $468.)

B) Spend from a minimum of 48 hours to a maximum of 1 year in the county jail.

C) Have your driver's license suspended for 1 year.

D) The judge may place you on summary probation for a period of from 6 months to 3 years. To be on probation means that you are required by the court to live up to certain terms or conditions in return for a suspension of some portion or all of the penalties which could be imposed. Terms of probation may include a limit on the conditions under which you may drive (e.g., for employment only), participation in an education program, and so forth. You may be required to restrict or eliminate any drinking before driving, according to some specific standard.

If you fail to comply with any of the terms of your probation, the court may find you in violation, revoke your probation, and issue a bench warrant for your arrest. Penalties for violating probation usually correspond to the suspended terms of sentence (jail time, license suspension, and/or fine) when you were convicted. Probation violation, for example, could result in a sentence of up to 1 year in jail and/or an increase in fine to $1,000. And, if you are arrested for DUI while still on probation, you will not only be penalized for probation violation, but you may also be tried for another misdemeanor.

Alternative 2. Penalties for a second offense of Driving Under the Influence (treatment program). If offered a chance to participate in an alcoholism treatment program, and you choose to participate in the program, you will be sentenced as follows:

A) You will still pay a fine of $355 to $1,000, plus penalty assessment.

B) You will have to participate in an approved alcoholism program for a period of 1 year. The cost of the program will be paid by you.

C) You will be placed on summary probation.

D) Violation of probation, including failure to participate in or complete an approved program will result in the consequences described in Alternative 1.

Alternative 3. Penalties for a second offense of Driving Under the Influence if offered a chance to participate in the Drunk Driving Warning System Research Project are the following:

A) You will still pay a fine of $355 to $1,000, plus penalty assessment.

B) You will have to participate in the Drunk Driving Warning System research project for a period of approximately 6 months.

C) Your driver's license will be restricted while you participate in the project.

D) You will be placed on summary probation. The conditions of this probation are listed on the pages following this introduction.

E) Violation of probation, including failure to participate in or complete the DDWS research project will result in the consequences described in Alternative 1.

Please read the conditions of probation for the Drunk Driving Warning System research project, and the STI rules and conditions for subjects which follow. When you finish, we will continue with the personality inventory.

EXHIBIT 4. RULES AND CONDITIONS FOR PARTICIPATION IN THE DRUNK DRIVING WARNING SYSTEM RESEARCH PROJECT

The following list of rules and conditions for participation indicate what is required of you to participate in the project. These rules become a condition of your probation as stated in Probation Condition No. 4.

We have been instructed by the judge to return you to the court if you violate any of these rules even once. If you are returned to the court the judge will determine whether you will be allowed to continue in the project, or if you will be held in violation of probation and resentenced.

1) Report to the Inglewood Driver Improvement Analyst Division of the Department of Motor Vehicles (621 North La Brea, Inglewood, CA) to have your driver's license restricted. This is to be completed no later than _____.

2) Obtain liability insurance for a 1978 Chevrolet Nova, license number _____, vehicle ID number _____, owned by the United States Government. This insurance is to be valid for the period from _____ to _____; and Systems Technology, Inc., 13766 South Hawthorne Boulevard, Hawthorne, California 90250 is to be named as co-insured. Proof of insurance is to be submitted no later than _____. If you are experiencing problems in obtaining insurance you are to notify _____ _____ at STI no later than _____; they will assist you in obtaining the insurance.

3) You will be required to pay for all gasoline and oil consumed by the vehicle while it is in your possession. In addition, you will be required to pay STI 8/10¢ per mile to take care of normal maintenance.

4) You are to report to STI for check-in beginning on _____ (date) at _____ (time), and continuing at biweekly intervals until you are finished with the project.

5) You are not to tamper with, play with, attempt to disable or remove, or disconnect any portion of the Drunk Driving Warning System.

6) You are not to drive the car if you have not passed the test or if the alarms are "on."

7) You are not to allow anyone else to drive the DDWS car.

8) If there is <u>any</u> mechanical problem with the car you are to call either Tony Stein or Wade Allen at 213/644-4332 for instructions on how to proceed.

9) If you are arrested for any reason while driving the car you are to have the police notify either Tony Stein or Wade Allen at 213/644-4332. A card with these instructions has been included with the vehicle registration.

10) If you are involved in any accident while driving the car you are to notify either Tony Stein or Wade Allen at 213/644-4332.

11) You will need to provide STI with name, birthdate, and drivers license number of all household members.

12) You will be required to keep a log of all driving activities while assigned to the DDWS car.

I certify that I have read and received a copy of the Rules and Conditions, and that I fully understand them.

_____ _____

Subject Date

_____ _____

Witness Date

EXHIBIT 5. LEGAL OPINION

ROLAND L. COLEMAN, JR.
ATTORNEY AT LAW
432 SOUTH HARVARD, SUITE 109
LOS ANGELES, CALIFORNIA 90020
(213) 620-5000

November 7, 1980

LEGAL OPINION

To: Anthony Stein

From: Roland Coleman

Re: Validity of Drunk Driver Warning System (DDWS) Project Probation Conditions

FACTS:

Systems Technology, Inc. (STI), in conjunction with cooperating local courts, will administer a program wherein individuals convicted of driving while under the influence of alcohol a second time within five years must adhere to probation conditions developed by STI and the courts. Some of the conditions are well established and do not warrant an examination for validity. Other conditions are peculiar to the DDWS project and therefore should be examined for validity. Those conditions are:

1) Participation in the DDWS project;

2) Report to STI for training and subsequent check-in;

3) Obey all rules and conditions of STI in conjunction with the research projects;

4) Driver's license restricted to use of the STI vehicle;

5) No one else may drive the STI vehicle;

6) The subject is not to drive without automobile insurance with STI as additionally insured.

Question;

Do the above listed conditions appear to be valid?

Answer:

Yes.

Discussion:

A California Supreme Court case, People v. Lent (1975), 14 Cal. 3d 481, stated standards to be applied in an examination of the validity of conditions of probation. Those standards are that the conditions must have a relationship to the crime which was committed, relate to conduct which itself is criminal, and must require or forbid conduct which is reasonably related to future criminality.

The above stated conditions all appear to meet the standards stated above. They all relate to driving which certainly has a relationship to the crime for which the project participants were convicted. They relate to conduct which itself is criminal, i.e., if the driving occurs occurs while a person is under influence of alcohol. The conditions do require or forbid conduct which is reasonably related to future criminality. In other words, all the above conditions are valid because they tend to reduce the potential for the reoccurrence of the subject offense and encourage behavior modification for the better with no undue burdens.

An additional factor that legitimizes the above stated conditions is an amendment to the California Vehicle Code which states the need for the DDWS project and authorizes the utilization of it by the courts. This ammendment, Assembly Bill 3482, is a statement of public policy in support of the DDWS project and its goals. It is support for the listed conditions of probation because the legislature considered them during passage of the bill.

APPENDIX F

FIELD TEST EXPERIMENTAL DESIGN AND PROCEDURES

A. INTRODUCTION

Prior appendices have given an overview of the project, and a detailed description of the selection procedures used in obtaining subjects for the field test of the Drunk Driving Warning System. This appendix describes details of the field test of the system.

This appendix is divided into three parts. In the first we discuss the experimental design for the field tests. The second includes all procedures for the field tests. The third briefly describes our briefings to enforcement agencies.

B. EXPERIMENTAL DESIGN

In order to answer a number of questions on DDWS feasibility and acceptability the experiment was designed with three distinct phases: Phase 1, where the subject was trained, and "baseline" usage data were obtained; Phase 2, operation of the DDWS equipped vehicle; and Phase 3, a period with the CTT/DDWS alarms turned off designed to determine if there was a change in driving patterns from Phase 2 operation.

This design was formulated to answer such questions as:

- Are there any changes in driving behavior?
- If driving patterns change, does driving behavior revert to "pre-DDWS" patterns when the DDWS system is removed?
- To what extent can a reduction in DWI trips be inferred?
- How often is the vehicle driven with the alarms on?

The methodology for obtaining answers to these questions, and others, as well as other data analysis procedures is discussed in detail in Appendix G on data analysis.

C. PROCEDURES

1. Preliminary Processing

Once subjects completed the selection procedures, they were ready to begin the field test. The first step at STI was to insure that the subject's driver's license had been restricted. By restricting the subject's license to use of the DDWS vehicle it was assumed that the DDWS car was the only vehicle driven by the subject.

It is important to view the risks that driving another vehicle presented to the subject. The subject did not need to be arrested for another drinking driving episode to be in violation of probation; he or she need only be stopped for some minor equipment or traffic violation. Once a subject is stopped the officer will be able to determine that the subject's license is invalid, and will issue a citation for violation of Section 14603 of the Vehicle Code.* Violation will in turn be reported to the court. A hearing for probation violation will then be held [Condition 10 of probation, Appendix E, Exhibit 2) states that the subject is not to drive without a valid license]. If a subject is found in violation of probation then they may be resentenced on the original charge; that is, the subject will spend 48 hours to 1 year in jail, have their driver's license suspended for one year, and possibly have the fine increased to a maximum of $1000. One subject in this program was caught driving another car (Appendix I, Subject No. 13). He was given an additional fine but remained in the program.

Following the license restriction the subjects were required to obtain liability insurance for the DDWS vehicle. STI was named as co-insured on the policy for two reasons. First, should a subject try to cancel the insurance we would be notified; and second, in the event of legal action STI was afforded some protection.

---

*14603 V.C.: No person shall operate a vehicle in violation of the provisions of a restricted license issued to him.

2. Phase 1 and Training

After completing the driver's license and liability insurance requirements the subjects came to STI to be assigned a DDWS-equipped car. The vehicles were issued with the Critical Tracking Task (CTT) deactivated (but with the data logger working). The "baseline" data obtained during this two week period should be most like the person's preconviction driving patterns. The subject had not been trained on the DDWS system, so that any driving pattern changes that had taken place could not be attributed to the DDWS.

Following the initial two week period the subject reported to STI for training. The DDWS system was turned on, but the alarms remained off.

During the laboratory optimization experiments (Volume I), it was found that the 300 trials required to establish an individualized pass level were tedious for the subjects. They were more concerned with minimizing their time involvement at STI than performing the CTT task well, and being rewarded. Some subjects were deliberately failing trials and refusing to take the 10 minute breaks in order to spend as little time as possible on training.

Because of this experience a new training strategy was developed that was successful in working with this "reluctant volunteer" subject population.

Each subject reported to STI for 3 days of training. During each training day the subject was required to take 100 trials. Subjects performed 25 trials and then were required to take an out-of-the-vehicle rest period of at least 2 minutes. If the subject failed a trial, the system was not reset for 30 seconds. If the trial was passed the system was reset immediately. Ths procedure altered the subject's contingencies so that in order to minimize training time it became necessary to pass as many trials as possible. (Note: the experimenter had complete control of DDWS operation during training.)

During training the subject's pass criterion was gradually increased according to the following table:

PERFORMANCE		CHANGE IN PASS CRITERION
PASS	FAIL	
0	4	-0.1*
1	3	0
2	2	0
3	1	+0.1
4	0	+0.2

*In no case is the pass criterion lowered below a criterion that has had 3 passes.

Between training days the subjects were using the DDWS vehicle. They were instructed that the DDWS was to be used prior to each driving episode at a minimum. Additional practice was allowed as often as the subjects desired. The subjects were also instructed that only they were to take the test.

Training session No. 3 took place on the final day of the 2 week in-vehicle training period. The data obtained from this final training session was analyzed, and a CTT pass level was set as described in Appendix G.

The test strategy was set so to require 1 pass out of 4 trials in order to deactivate the alarms. Previous analysis performed for the optimization tests (Volume I) showed that this strategy combined the best balance of minimum sober rejection with maximum impaired discriminability.

Any noncompliance, or failure to obey the rules, on the part of the subject resulted in a judicial hearing. This process is discussed following the "Judicial Processing" flow chart in Section I of Appendix D.

3. Phase 2 and Biweekly Check-Ins

Once training had been completed, and the CTT pass level set, the subject entered Phase 2 of the tests. During Phase 2 the subjects operated the DDWS vehicle in its normal mode, that is, with the DDWS system and alarms operating.

The subjects were required to check in at STI on a biweekly basis. During these check-in periods STI personnel performed the following tasks (see Exhibit 1 of this Appendix):

Step 1. System seals

a) Inspect seals in the following locations and insure that no tampering has taken place:

1) Front turn indicator bulbs
2) Battery and power connections
3) Horn wire
4) Kick panel screws
5) Front theshold plate
6) Rear theshold plate
7) CTT cables
8) CTT cover
9) CTT lock
10) Rear indicator bulbs

Step 2. Data tape

a) Remove data tape
b) Clean head and capstan
c) Install new data tape
d) Seal cover and lock
e) Read retrieved data

Step 3. Inspect vehicle

a) Check for visible body damage
b) Check tire pressures
c) Check oil and water

Step 4. Debrief subject

a) Any problems encountered with the DDWS system
   1) When
   2) Describe

b) Any case of failing the test after drinking
   1) How long after drinking
   2) How much had subject been drinking
   3) What was subject's action

c) Any case of failing the test when sober
   1) When
   2) Had subject been drinking in last 24 hours
   3) If yes, how much and when
   3) What was subject's action

d) Was subject stopped by police for any reason
   1) When
   2) Why
   3) Disposition

e) Any change in general driving pattern

The Step 1 checks were to determine if the subject had attempted to circumvent the DDWS system. The major information in Step 2 obtained from reading the data tape is discussed in Appendix G. The Step 3 checks were included as a safety precaution. Because of the major reduction in full-service gasoline stations, most cars do not receive these basic checks on a regular basis. It would have placed a great hardship on the project if we lost a car because it was run with no oil or without enough coolant. The subject debriefing in Step 4 was designed to help clarify any abnormalities that might show up on the data tape. A debriefing form used for this purpose is given in Exhibit 2 to the appendix.

Other than the biweekly check-in requirement, the subjects were free to function normally during the 18 weeks of Phase 2. When the subjects came in on the 22nd week, Phase 3 began.

4. Phase 3

Phase 3 was designed to determine if there was any reason to believe that the CTT feedback alone might be sufficient to continue any behavior changes that may have taken place during Phase 2, and to see if the subject's driving patterns reverted to those observed during Phase 1.

During the first two weeks of Phase 3 the subject operated the car with the DDWS test operating, but with the alarms deactivated. If there was any carryover effect we would see a continuation of the Phase 2 driving patterns. If not, we might see instances of driving after failing the test, or a change in vehicle use patterns. During the final two weeks of the subject's participation in the project we completely deactivated the DDWS system. If the system caused a change in driving patterns, and this shift had no carryover effect, we would see a change in vehicle use patterns.

As in training, any infraction of the conditions of probation or STI rules would result in the subject being returned to court for judicial processing.

Both Judge Fujisaki and Judge Thompson requested that subjects be returned to court for any infraction of either the conditions of probation or the STI rules. In returning the subjects to the court STI prepared a brief letter indicating the nature of the infraction, its severity, and how information about the infraction was obtained. Examples for several subjects are given in Appendix I.

When subjects were returned to court the judge held a probationary hearing and reviewed the facts of the case. During this review the judge decided the suitability of the subject to return to the project. These decisions were based on the severity and nature of the infraction.

If the judge decided to reinstate a subject in the project the subject continued from where he or she left off in the project. If it was decided the subject was no longer appropriate for the project, his/her participation in the project was terminated. The DDWS vehicle was then returned to STI and the judge subsequently decided on appropriate resentencing.

D. AGENCY BRIEFINGS

STI personnel presented briefings to enforcement agencies with jurisdiction in Los Angeles County. These agencies included local police departments, sheriffs' offices, and Highway Patrol divisions.

These briefings included a description of the project and its intent, and STI's expectations of the agency (e.g., calling STI if they arrested a subject and needed to impound the DDWS vehicle).

EXHIBIT 1. BIWEEKLY CHECK-IN

Name _____ Date _____

Car No. _____ Mileage _____

	OK
Seals:	
Left front blinker	☐
Right front blinker	☐
Battery	☐
Power wire	☐
Horn	☐
Kick panel	☐
Front threshold plate	☐
Rear threshold plate	☐
CTT cables	☐
CTT cover	☐
CTT lock	☐
Left rear blinker	☐
Right rear blinker	☐
Data Tape:	
Remove data tape	☐
Clean capstan and head	☐
Install new data tape	☐
Seal cover	☐
Seal lock	☐
Read retrieved tape	☐
Vehicle Inspection:	
No visible body damage	☐
Left rear tire pressure	☐
Right rear tire pressure	☐
Right front tire pressure	☐
Left front tire pressure	☐
Oil level	☐
Water level	☐

EXHIBIT 2. BIWEEKLY DEBRIEFING FORM

Were there any problems with the system? _____ If yes, when? _____ Describe the problem _____

_____

_____

Was there any time that you tried to take the test after you had been drinking and failed? _____ If yes, how long since your last drink? _____ How much had you had to drink? _____ _____ Over what period of time? _____

What did you do? _____

Did you fail the test when you were sober? _____ If yes, when? _____ What did you do? _____ _____ Had you been drinking in the prior 24 hours? _____

If yes, how much did you drink? _____ Over what period of time? _____ When did you stop drinking? _____

Were you stopped by the police for any reason? _____ If yes, why? _____ What happened?

_____

_____

Have you changed driving patterns? _____ Times_____

Frequency _____ Length _____

Comments: _____

_____

_____

Check-in performed by: _____
(Signature)

APPENDIX G

DATA COLLECTION AND ANALYSIS

A. INTRODUCTION

This appendix presents data collection and analysis procedures designed to allow determination of the potential utility of the DDWS for deterring DWI trips. Three types of data are discussed here:

- Digital data automatically recorded on cassettes by the DDWS.
- User acceptance and compliance and public acceptability information obtained in structured interviews.
- Reliability and maintainability data on the DDWS system.

A digital cassette recorder that is part of the DDWS trunk-mounted electronics package records data during critical events in the DDWS operation. These events include turning on or off the ignition, the score for a CTT test trial, and exceeding 10 mph without passing the test.

The digital data analysis process occurred in three stages, each serving a separate purpose:

- Computer entry and summary analysis of all training data to allow initial setting of a subject's CTT pass level.
- Computer entry and summary analysis during each biweekly check-in to aid in determining compliance with conditions of probation (as given in Appendix E) and allow upgrading criterion levels if necessary.
- Overall analysis at the conclusion of the field test to determine the utility of DDWS for deterring DWI trips.

User acceptance and public acceptability information cover all subjective and objective data obtained verbally from subjects, judges, enforcement agency personnel, etc. These data were collected throughout the field test phase as follows:

- Through biweekly debriefing information that has been described in detail in Appendix F. Information obtained included incidence of drinking and driving, experience with the test, changes in driving pattern, system malfunctions, etc.
- Informal feedback and information obtained in structured interviews with judges and public health officers.
- To the extent possible, debriefings will also be obtained from enforcement personnel, and the subjects' families, friends, employers, coworkers, etc.

Reliability and maintainability data was collected from subjects' logs, subject debriefings, and DDWS system inspections at the end of each six-month assignment period. Data from the pilot tests was also included.

The above data analysis phases are discussed further below.

B. DIGITAL DATA ANALYSIS

1. Training Analysis

The data logger digital data was entered, reduced, and processed on the Tymshare IBM 370 system to allow analysis of training data, and biweekly check-in data, and was then stored in a format that would permit overall data base analysis at the end of the field test. All of these functions were accomplished in the same program, and a simplified flow chart for the program is given in Fig. G-1.

The data analysis process was initiated by reading data into the Tymshare System via a special Datel reader. At this stage a printout of the raw data could be obtained which provided a backup record in case the Tymshare system was not accessible. An example of the raw data format is given in Table G-1. Next, the data were reformatted and processed to provide several data output formats as follows.

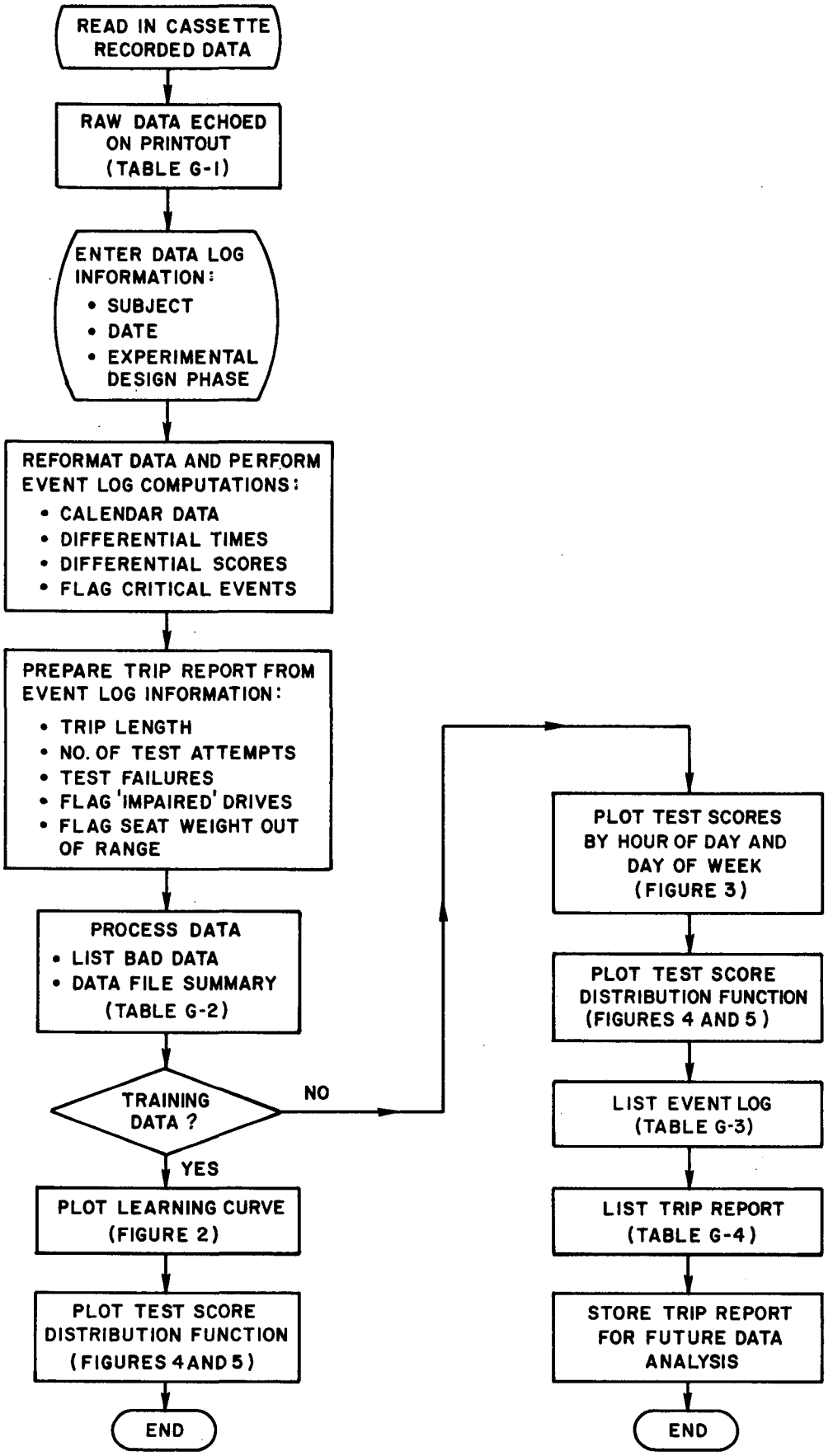
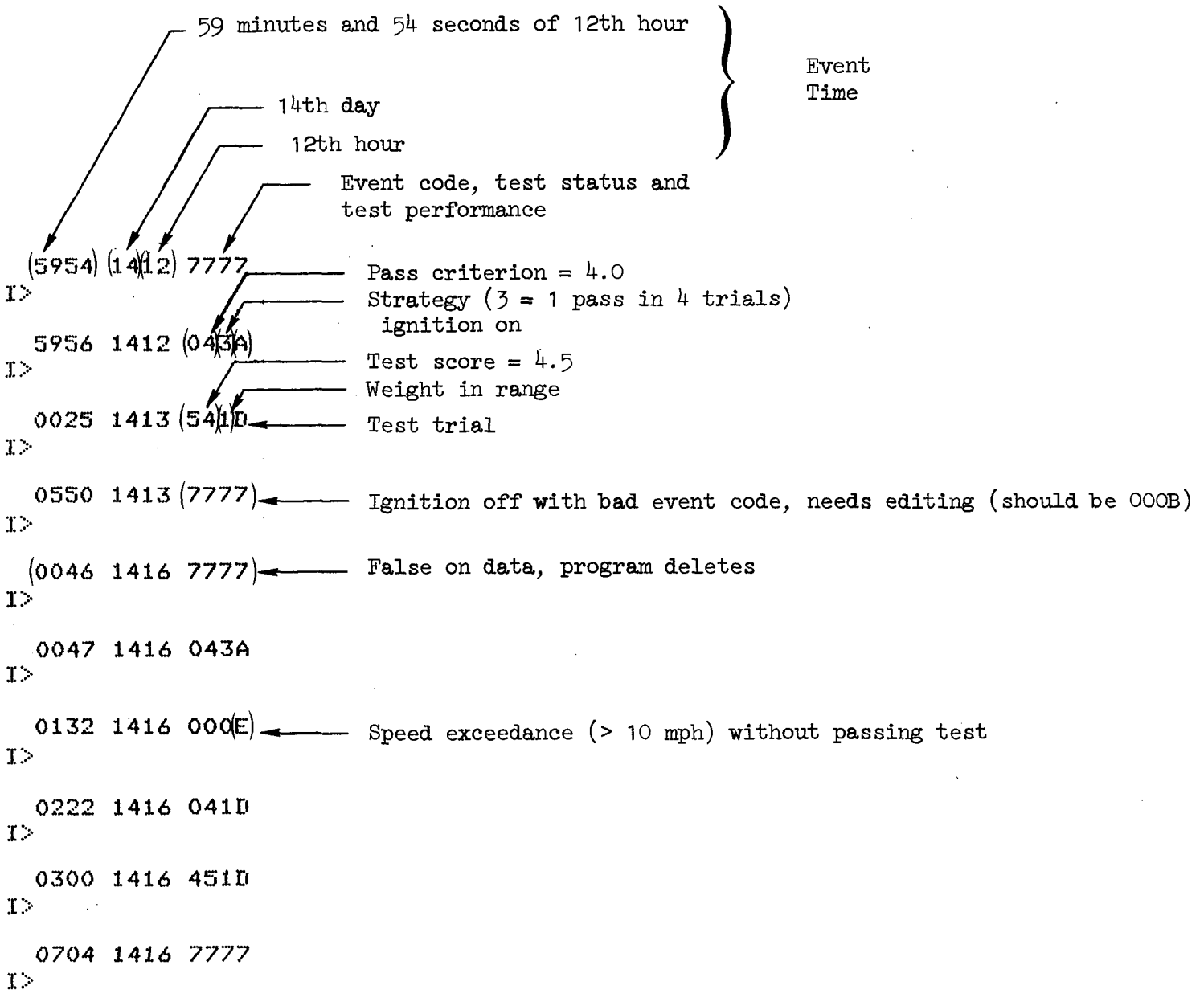


Figure G-1. Cassette Recorded Digital Data Reduction Program

TABLE G-1. RAW DATA PRINTOUT



First, the computer immediately printed out all "bad" (non-standard format) data, and summary statistics as illustrated in Table G-2. At this stage, if the experimenter was analyzing training data, then a learning curve was generated. An example is given in Fig. G-2. The learning curve consisted of CTT scores plotted as a function of trial number, with medians indicated for 4 trial blocks. The data in Fig. G-2 are actually from a well trained pilot test driver, and illustrate very stable performance.

If the data represented a biweekly check-in period, then the data were printed out in an event log. The format of the raw data is quite crude as noted in Table G-1, and the event log considerably amplifies the format based on information supplied by the experimenter when the data reduction is performed. An example event log listing is given in Table G-3. Here we see that the computer has supplied the Julian calendar date and 24 hour time for each event (ignition on, test trial, etc.). The event log also listed the incremental time for each event from ignition on, the score differential relative to the criterion; flags are also provided for bad data, 10 mph speed exceedences with alarms on, seat weight out of range, etc.

The event log format is intentionally redundant in order to aid the check-in experimenter in quickly assessing the subject's car usage experience during the preceeding two weeks. Based on a quick review of the event log, other data formats discussed below, and referring to the subjects own hand recorded trip diary, the experimenter followed up with a debriefing on suspicious trends if present. Several examples of this are discussed under individual subject case histories in Appendix I.

The trip report shown in Table G-4 offers about a 4 to 1 compression of the event log data. Each line of data summarizes all events occuring between an ignition on and ignition off: length of drive, number of events in a drive, measures of task performance and assumed impaired drives (i.e., a hard fail followed by either a 10 mph speed exceedance, or an apparent trip length greater than 15 minutes which could imply driving less than 10 mph to prevent the horn from honking). The trip report files were subsequently used to analyze overall field test results.

TABLE G-2. PROGRAM INITIATION, BAD DATA LISTING AND SUMMARY STATISTICS

```
START
EXECUTION BEGINS...

   ENTER SUBJ. NO., CAR NO., EXPT. PHASE NO.,
?
>1,1,4,

   ENTER 1 FOR DIAGNOSTICS OR 0 FOR NORMAL, IPRINT
?
>0,0,

   ENTER INTEGER NOS WHEN LOGGER LAST INITIALIZED
   MONTH,DAY,YEAR, TEST WEEK NO, WEEK DAY NO, LOGGER DAY NO,
?
>3,13,81,1,6,13,
```

Initialization Data Entered by Experimenter

```
000 0  253 8  1    **
4845 1330 EEEF     **
3042 142E 0875     **
000A 2283 03BB     **
3800 2A21 2C36     **
468C2  A20EEE      **
4718 1610 0334     **
2391 22C2 0019     **
5527 1615 0375     **
                   **

        DATE OF LAST EVENT IS   3:56P MAR 16  81


    AVG USAGE TIME =  10 MINS FOR   26 USES

    AVG FAIL RATE ON FIRST TRIAL/USAGE =    9%
       8   8  13  13  13  13  17  21  26  26  43  47

    AVG NO OF TRIALS TO A PASS =   1.14 FOR   22 USES

    AVG DELAY TIME TO A FIRST PASS =   50 SECS

    AVG PASS MARGIN =   1.2


    NO OF TRIALS =   30

     2.20 -2.01    3.1
     5.49 -1.60    3.2
     8.79 -1.35    3.3
    12.09 -1.17    3.4
    15.38 -1.02    3.5
    18.68 -0.89    3.9
    21.98 -0.77    4.0
    25.27 -0.67    4.2
```

Bad data

Data File Summary Statistics

Test score Distribution Analysis (also plotted, see Fig. 4)

Cumulative Percentile | Normal Deviate | Test Scores in ascending order

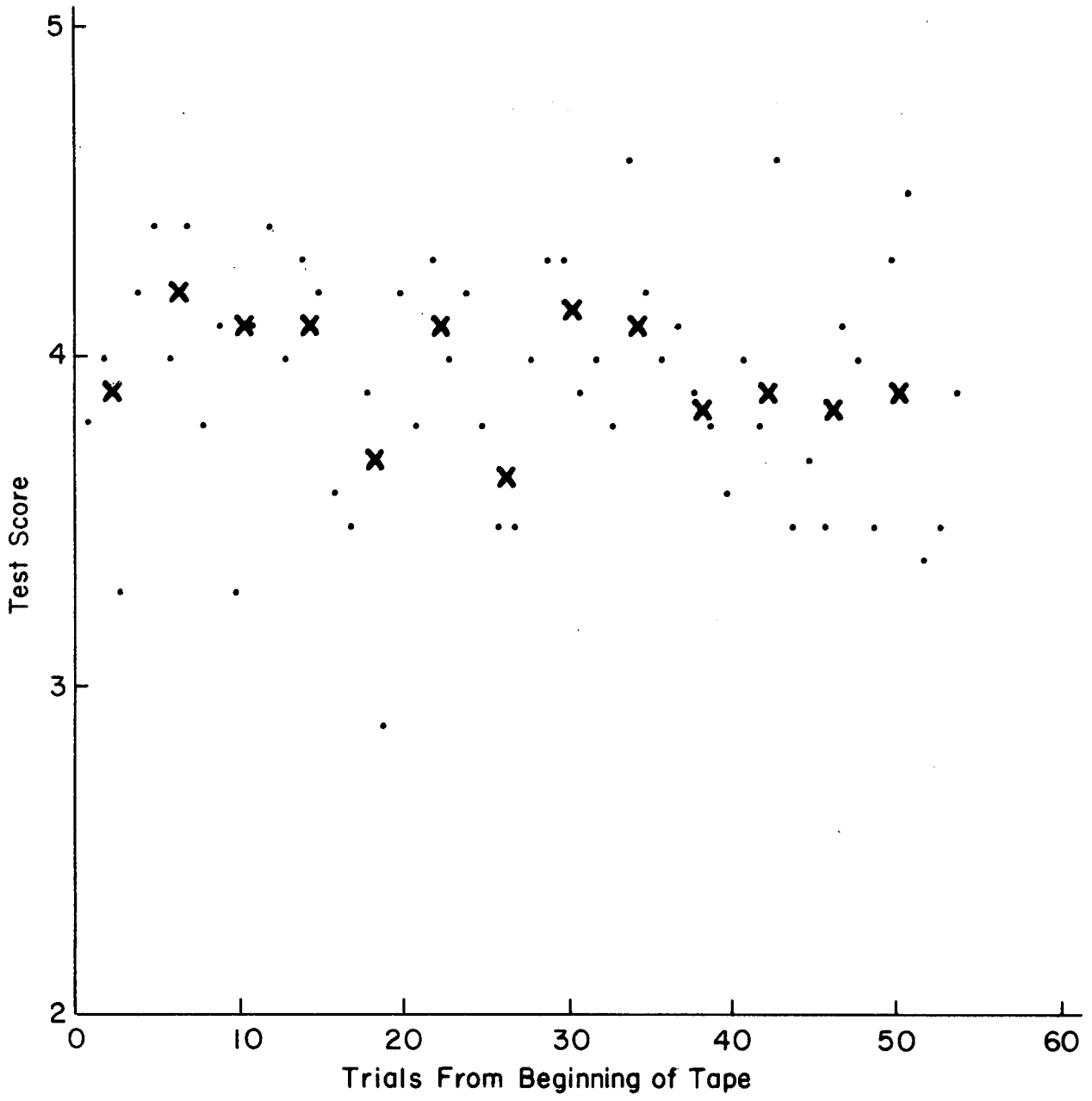


Figure G-2. Example Training Plot Format

TABLE G-3. EXAMPLE EVENT LOG

Test week	Weekday (Sunday = 1)	Time (hrs., 24 hr. clock)	Time from ignition on (seconds)	Time from previous event (seconds)	Pass criterion	Test score	Criterion - score	Data questionable because of bad data	Event letter code	Ignition on (1)	Ignition off (2)	Test Pass (7)	Weight out of range (9)	Speed violation (5)	Bad data	Hour	Time of day	Min	P = PM (AM blank)	Month	Day	Year	Experiment phase	Subject number	Car number
1	7	11.4436			4.0				A-1----							11	:26			MAR	14	81	4	1	1
1	7	11.4497	22	22		3.2	-0.8		D 4							11	:26			MAR	14	81	4	1	1
1	7	11.4553	42	20		3.4	-0.6		D 4							11	:27			MAR	14	81	4	1	1
1	7	11.4650	77	35		4.7	0.7		D 7							11	:27			MAR	14	81	4	1	1
1	7	12.1369	2496	2419					B 2							12	: 8	P		MAR	14	81	4	1	1
1	7	12.9989			4.0				A-1----							12	:59	P		MAR	14	81	4	1	1
1	7	13.0069	29	29		4.5	0.5		D 7							1	: 0	P		MAR	14	81	4	1	1
1	7	13.0972	354	325					B 2							1	: 5	P		MAR	14	81	4	1	1
1	7	16.0130			4.0				A-1----							4	: 0	P		MAR	14	81	4	1	1
1	7	16.0255	45	45					E 5							4	: 1	P		MAR	14	81	4	1	1
1	7	16.0394	95	50		4.0	0.0		D 4							4	: 2	P		MAR	14	81	4	1	1
1	7	16.0500	133	38		5.4	1.4		D 7							4	: 3	P		MAR	14	81	4	1	1
1	7	16.1178	377	244					B 2							4	: 7	P		MAR	14	81	4	1	1
1	7	16.1542			4.0				A-1----							4	: 9	P		MAR	14	81	4	1	1
1	7	16.1617	27	27		4.4	0.4		D 7							4	: 9	P		MAR	14	81	4	1	1
1	7	16.2772	443	416					B 2							4	:16	P		MAR	14	81	4	1	1
1	7	16.4039			4.0				A-1----							4	:24	P		MAR	14	81	4	1	1
1	7	16.4122	30	30		4.6	0.6		D 7							4	:24	P		MAR	14	81	4	1	1
1	7	16.9036	1799	1769					B 2							4	:54	P		MAR	14	81	4	1	1
1	7	17.5233	4030	2231		5.1	1.1	?	D 7							5	:31	P		MAR	14	81	4	1	1
1	7	17.6819	4601	571					B 2							5	:40	P		MAR	14	81	4	1	1
1	7	18.0047			4.0			?	A-1----							6	: 0	P		MAR	14	81	4	1	1
1	7	18.0128	29	29		4.8	0.8		D 7							6	: 0	P		MAR	14	81	4	1	1
1	7	18.1536	536	507					B 2							6	: 9	P		MAR	14	81	4	1	1
1	7	19.4855			4.0				A-1----							7	:29	P		MAR	14	81	4	1	1
1	7	19.4942	31	31		4.8	0.8		D 7							7	:29	P		MAR	14	81	4	1	1
1	7	19.6711	668	637					B 2							7	:40	P		MAR	14	81	4	1	1
1	7	19.9853			4.0				A-1----							7	:59	P		MAR	14	81	4	1	1
1	7	19.9933	29	29		4.8	0.8		D 7							7	:59	P		MAR	14	81	4	1	1
1	7	20.1294	519	490					B 2							8	: 7	P		MAR	14	81	4	1	1
1	7	22.2086			4.0				A-1----							10	:12	P		MAR	14	81	4	1	1
1	7	22.2236	54	54		5.0	1.0		D 7							10	:13	P		MAR	14	81	4	1	1
1	7	22.3386	468	414					B 2							10	:20	P		MAR	14	81	4	1	1
2	1	10.5247			4.0				A-1----							10	:31			MAR	15	81	4	1	1
2	1	10.5344	35	35		3.1	-0.9		D 49							10	:32			MAR	15	81	4	1	1
2	1	10.5422	63	28		3.3	-0.7		D 49							10	:32			MAR	15	81	4	1	1
2	1	10.5506	93	30		3.9	-0.1		D 49							10	:33			MAR	15	81	4	1	1
2	1	10.5714	168	75		3.5	-0.5		D 49							10	:34			MAR	15	81	4	1	1
2	1	10.6114			4.0				A-1----							10	:36			MAR	15	81	4	1	1
2	1	10.6117	1	1					B 2							10	:36			MAR	15	81	4	1	1
2	1	10.6275			3.0				A-1----							10	:37			MAR	15	81	4	1	1
2	1	10.7092	294	294				?	B 2						<---	10	:42			MAR	15	81	4	1	1
2	1	10.7297			3.0			?	A-1----							10	:43			MAR	15	81	4	1	1
2	1	10.7383	31	31		5.3	2.3		D 7							10	:44			MAR	15	81	4	1	1
2	1	10.7728	155	124					B 2							10	:46			MAR	15	81	4	1	1
2	1	11.0164			3.0				A-1----							11	: 0			MAR	15	81	4	1	1
2	1	11.0308	52	52		4.4	1.4		D 7							11	: 1			MAR	15	81	4	1	1
2	1	11.0914	270	218					B 2							11	: 5			MAR	15	81	4	1	1
2	1	12.3769			3.0				A-1----							12	:22	P		MAR	15	81	4	1	1
2	1	12.3875	38	38		5.6	2.6		D 7							12	:23	P		MAR	15	81	4	1	1
2	1	12.4894	405	367					B 2							12	:29	P		MAR	15	81	4	1	1
2	1	17.3853			3.0				A-1----							5	:23	P		MAR	15	81	4	1	1
2	1	17.3922	25	25		4.2	1.2		D 7							5	:23	P		MAR	15	81	4	1	1
2	1	17.5267	509	484					B 2							5	:31	P		MAR	15	81	4	1	1
2	1	17.8392			3.0				A-1----							5	:50	P		MAR	15	81	4	1	1
2	1	17.8489	35	35		4.9	1.9		D 7							5	:50	P		MAR	15	81	4	1	1
2	1	17.9000	219	184					B 2							5	:54	P		MAR	15	81	4	1	1
2	1	17.9103			3.0				A-1----							5	:54	P		MAR	15	81	4	1	1
2	1	17.9117	5	5					B 2							5	:54	P		MAR	15	81	4	1	1

TABLE G-4. EXAMPLE TRIP LOG

Test week number	Weekday number	Hour Time (24 hr. clock) at end of usage	Hour of week from Sunday at 12:00 + AM)	Usage time (ign on to ign off)(mins)	Number of episodes, total of:	Number of 10 min waits when in non-passed state	Number of trials in usage	Number of passes in usage	Number of fails in usage	Average number of trials to pass	Delay time to first pass (secs)	First trial result (-1 never took test, 0 fail, 1 pass)	Flag usages > 2 mins with no trials taken	Number of speed exceedances before first trial in usage	Number of speed exceedances in usage	Percent of trials with weight in range (-1 is no trials taken)	Average pass margin (score-criterion level)	Average passing score	Average of all score	Average of failing score	Experiment phase number (training = ; alarms off = ; alarms on =)	Subject number	Car number
1	6	17	137	8	1	0	1	1	0	1.00	204	1		0	0	100	0.9	4.9	4.9	0.0	3	5	7
1	6	18	138	11	1	0	1	1	0	1.00	52	1		0	0	100	0.8	4.8	4.8	0.0	3	5	7
1	6	20	140	26	1	0	1	1	0	1.00	37	1		0	0	100	1.0	5.0	5.0	0.0	3	5	7
1	6	21	141	11	1	0	1	1	0	1.00	40	1		0	0	100	1.0	5.0	5.0	0.0	3	5	7
1	7	11	155	42	1	0	3	1	2	3.00	77	0		0	0	100	0.7	4.7	3.8	3.3	3	5	7
1	7	12	156	6	1	0	1	1	0	1.00	29	1		0	0	100	0.5	4.5	4.5	0.0	3	5	7
1	7	16	160	7	1	0	2	1	1	2.00	133	0		1	1	100	1.4	5.4	4.7	4.0	3	5	7
1	7	16	160	8	1	0	1	1	0	1.00	27	1		0	0	100	0.4	4.4	4.4	0.0	3	5	7
1	7	16	160	30	1	0	1	1	0	1.00	30	1		0	0	100	0.6	4.6	4.6	0.0	3	5	7
1	7	18	162	9	1	0	1	1	0	1.00	29	1		0	0	100	0.8	4.8	4.8	0.0	3	5	7
1	7	19	163	12	1	0	1	1	0	1.00	31	1		0	0	100	0.8	4.8	4.8	0.0	3	5	7
1	7	19	163	9	1	0	1	1	0	1.00	29	1		0	0	100	0.8	4.8	4.8	0.0	3	5	7
1	7	22	166	8	1	0	1	1	0	1.00	54	1		0	0	100	1.0	5.0	5.0	0.0	3	5	7
2	1	10	10	1	1	0	0	0	0	0.0	0	-1		0	0	-1	0.0	0.0	0.0	0.0	3	5	7
2	1	10	10	3	1	0	1	1	0	1.00	31	1		0	0	100	2.3	5.3	5.3	0.0	3	5	7
2	1	11	11	5	1	0	1	1	0	1.00	52	1		0	0	100	1.4	4.4	4.4	0.0	3	5	7
2	1	12	12	7	1	0	1	1	0	1.00	38	1		0	0	100	2.6	5.6	5.6	0.0	3	5	7
2	1	17	17	9	1	0	1	1	0	1.00	25	1		0	0	100	1.2	4.2	4.2	0.0	3	5	7
2	1	17	17	4	1	0	1	1	0	1.00	35	1		0	0	100	1.9	4.9	4.9	0.0	3	5	7
2	1	17	17	1	1	0	0	0	0	0.0	0	-1		0	0	-1	0.0	0.0	0.0	0.0	3	5	7
2	1	17	17	3	1	0	0	0	0	0.0	0	-1	1	0	0	-1	0.0	0.0	0.0	0.0	3	5	7
2	1	19	19	7	1	0	1	1	0	1.00	45	1		0	0	100	1.5	4.5	4.5	0.0	3	5	7
2	1	19	19	9	1	0	1	1	0	1.00	39	1		0	0	100	2.0	5.0	5.0	0.0	3	5	7
2	2	10	34	6	1	0	1	1	0	1.00	42	1		0	0	100	1.9	4.9	4.9	0.0	3	5	7
2	2	10	34	25	1	0	1	1	0	1.00	26	1		0	0	100	1.9	4.9	4.9	0.0	3	5	7
2	2	10	34	1	1	0	0	0	0	0.0	0	-1		0	0	-1	0.0	0.0	0.0	0.0	3	5	7

Hard Fail (0 none, 1 is 4 fails at start of usage)

'Impaired' Usage (0 none, 1 is Hard Fail + speed exceedance & or > 15 min usage)

```
R> T=0.01/0.07 13:53:13

C>
```

In addition to the event log and trip report listings, two data plots were available to the experimenter. The first plot showed test scores by hour of the day and day of the week as illustrated in Fig. G-3. This format gave the experimenter a graphic view of car usage and task performance during a two week check-in interval which allowed insight into impaired driving periods (e.g., weekend night drives with low test performance levels). In the example we see that the pilot test driver drove Tuesday, Wednesday, and Thursday of the first week, and Sunday through Thursday of the second week. Low scores were encountered Wednesday afternoon and Thursday morning of the first week.

The second plot available to the experiment presented all of the biweekly test scores in a cumulative distribution function as shown in Fig. G-4. This format allows the data to be assessed in two ways. The bottom (low score) end of the distribution shows unusually low scores which may be due to impaired performance, or test attempts by someone other than the driver. This effect is illustrated very clearly in Figs. G-4 and G-5. Secondly, the upper half of the distribution permits assessing the driver's unimpaired performance capability. Long term learning trends can be detected here and the CTT pass score elevated if need be. Comparison of Figs. G-4 and G-5 shows that the pilot test driver had elevated his performance level from one data sequence to the next. Evaluating his performance at the 40 percent point (which gives a 2.5 percent chance of failing four trials in a row) we see that his pass criterion should be elevated from 4.6 to 5.2 (in the current example the pass criterion for the Fig. G-5 merely represented changing the pass criterion to a more appropriate level thus motivating the pilot test driver to try harder).

C. USER ACCEPTANCE AND PUBLIC ACCEPTABILITY

Data in this category was collected throughout the field test both informally and through structured debriefings. Subject reported information was obtained during the biweekly check-ins as discussed in Appendix F and Section III of the main report, and in a final structured debriefing at the end of the six-month assignment period. This final

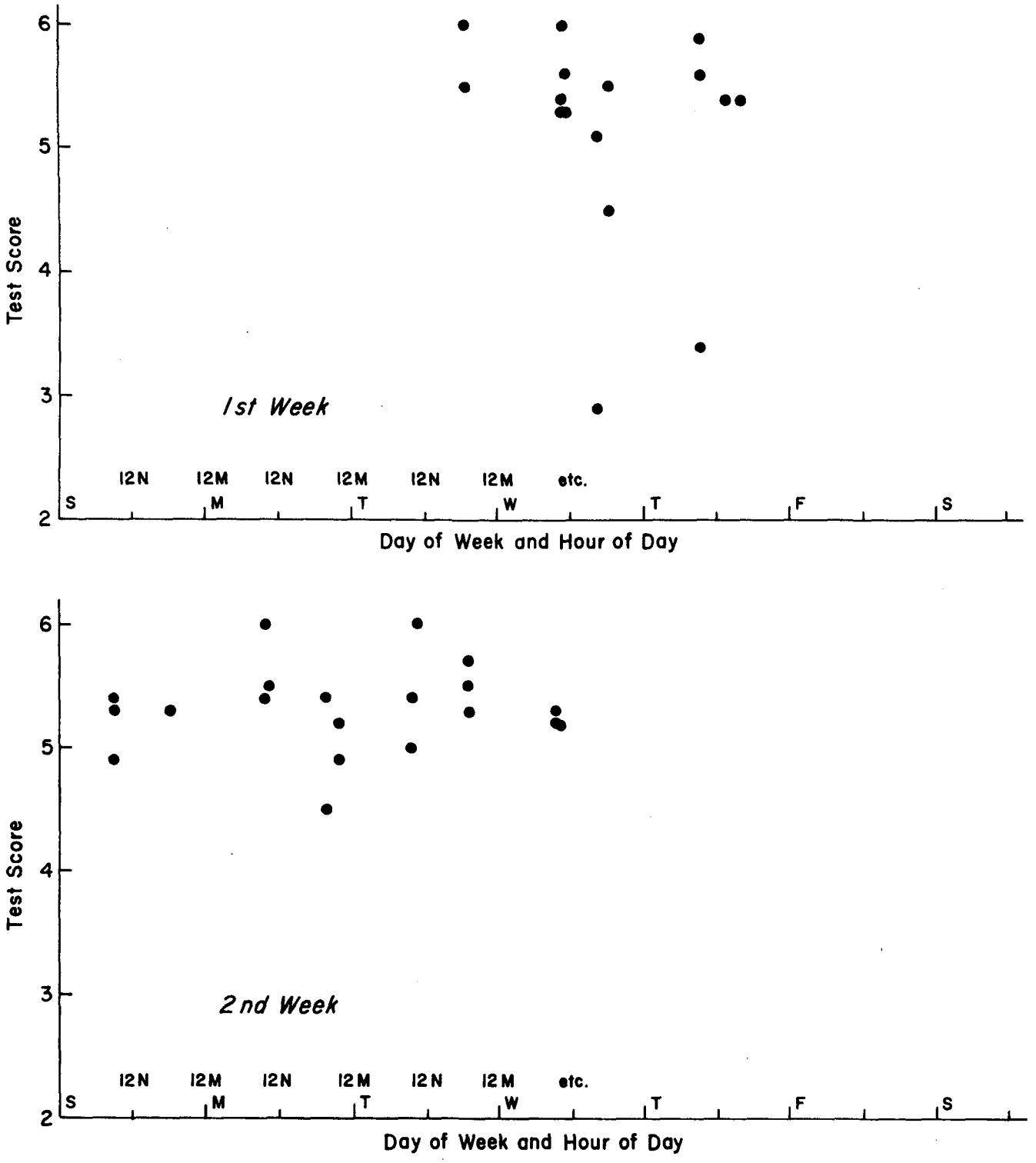


Figure G-3. Example Time Plot of Test Scores By Day of Week and Hour of Day

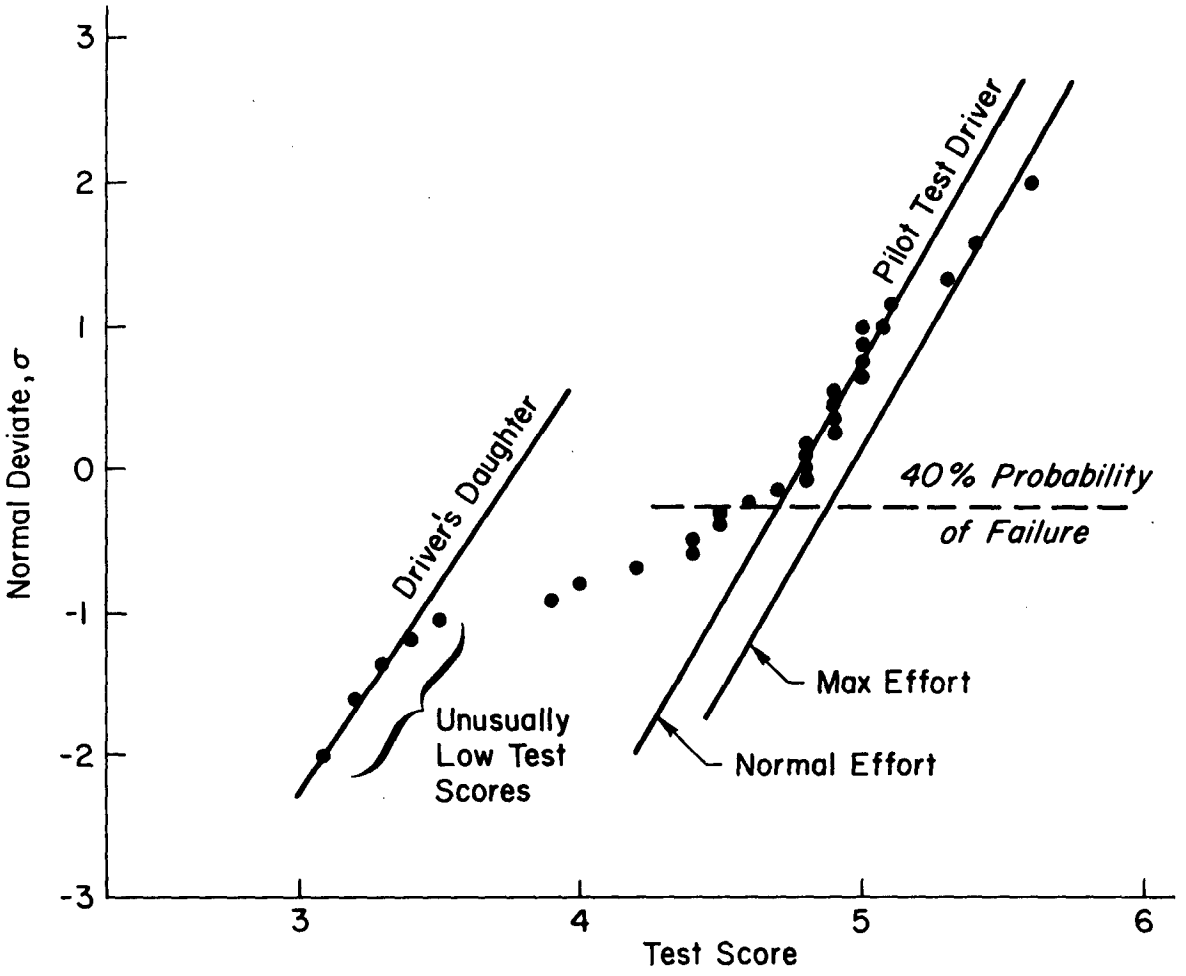


Figure G-4. Example Test Score Cumulative Distribution Plot

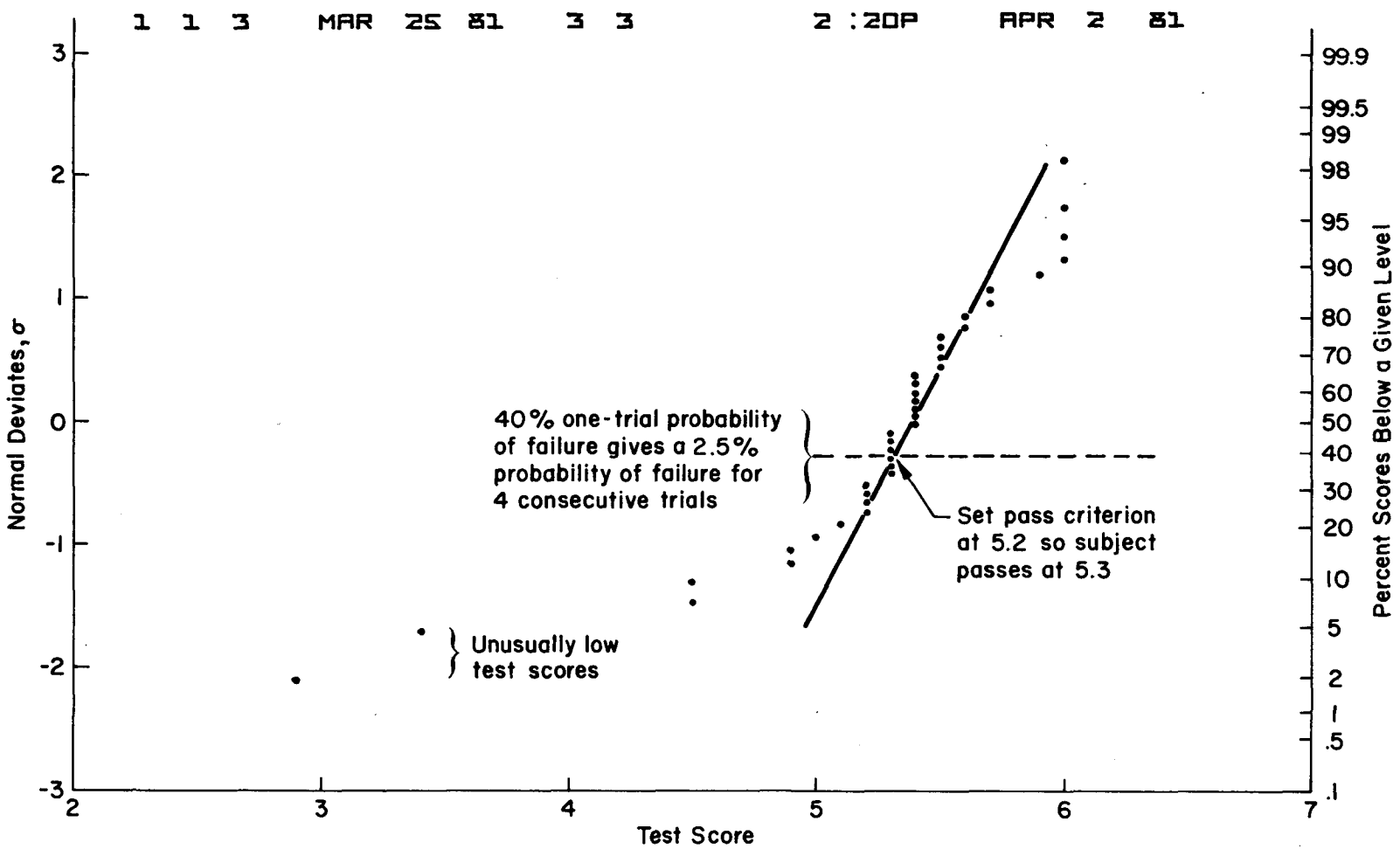


Figure G-5. Example Test Score Cumulative Distribution Plot

structured briefing was a requirement for the subjects' successful completion of the DDWS sanction. A subject final debriefing form is included in the exhibit at the end of this appendix. Court personnel were also given a final structured debriefing at the end of the field test phase, using the form included in the exhibit at the end of this appendix.

Subjects were asked on a voluntary basis to identify relatives, associates, friends, etc., who might wish to offer feedback on the DDWS sanction as interested bystanders. To the extent possible all of the above feedback was formalized through structured interviews and debriefings. Copies of the debriefing forms are included in the exhibit to this appendix.

D. RELIABILITY AND MAINTAINABILITY

Data from subjects' logs, biweekly briefings, and STI inspections were coalesced and summarized to indicate the reliability and maintainability record of the DDWS equipment. This data included the following:

- Percentage of trips thwarted due to unreliable equipment (DDWS electronics and vehicle mechanical functioning).
- Subject perception of equipment reliability and ability to pass the test (i.e., willingness to rely on DDWS for transportation).
- Level of effort required to maintain DDWS operability.
- Digital data recording reliability.
- Specific problems with DDWS electronics and vehicle mechanical functioning.

APPENDIX G EXHIBITS

DEBRIEFING FORMS

1. USERS DEBRIEFING

Name _____ Date _____

Debriefer _____

As you know, STI is in the process of evaluating the feasibility and effectiveness of the Drunk Driving Warning System. Beause you have been directly involved in this evaluation, we are interested in your comments, suggestions, and reactions. All responses are strictly confidential and for STI use only.

1. *Did you ever pass the test after you thought that you were intoxicated?*

   a. How often?

   b. What did you have to drink?

2. Did you ever fail the test and have to wait 10 minutes when you were sober? How many times?

3. Did you ever want to circumvent the DDWS?

4. Did you ever try to circumvent taking the test? If yes, please explain.

5. Did you ever use another car? If yes, how frequently and for what purpose?

6. How many friends, co-workers, or relatives knew that you were in the program? What were their reactions?

   a. Immediate Family:

   b. Neighbors:

   c. Relatives:

   d. Co-Workers:

7. Did the use of the vehicle or being in the program cause you any embarrassment? If yes, please explain.

8. Do you feel that this program is an effective deterrent to drunk driving? If not, why not?

9. If you could make your choice over again would you enter into this program?

10. How would you rate the effectiveness of this sanction as compared to the following:

    a. Fine

    b. Jail sentence

    c. License restriction

    d. License suspension

    e. Rehabilitation or treatment program

    f. DDWS

    g. Other (community service, etc.)

11. How would you rate the hardship this sanction imposes as compared to the above sanctions?

12. If you had your choice to select this sanction or any of the above sanctions what order would you select them in?

13. What changes would you recommend in the way this sanction is implemented?

    a. Selection

    b. Sentencing

    c. Training

    d. Probationary check-ins

    e. Completion and outprocessing

14. Is there anything about the system that you didn't understand?

15. Were there any malfunctions not previously reported?

16. Is test performance affected by distractions? What kinds of distractions?

    1. _____

    2. _____

17. What was the reaction of passengers to the system? Were they aware of the significance of the system?

18. Has the DDWS had any effect on your attitude toward drinking and driving?

    a. Are you more cautious?

    b. Do you avoid driving after drinking?

    c. Do you avoid driving?

    d. Do you avoid drinking?

    e. Has your attitude toward other people drinking and driving changed?

    f. Which changes do you think will be temporary? Permanent?

19. Do you think driving with a DDWS for 6 months can permanently teach a driver to know when he or she is impaired?

2. DEBRIEFING FOR USER'S RELATIVES, ASSOCIATES, OR FRIENDS

Name _____ Date _____

Debriefer _____

STI is in the process of evaluating the feasibility and effectiveness of a Drunk Driving Warning System. Your name has been given to us by one of our participants in the project, Mr./Ms. _____. All responses are confidential and for STI use only. Please answer the following:

1. Were you aware that the user was in the program and that he had to take the test prior to driving the car?

2. Did you ever drive with the user?

3. Did you notice any changes in the behavior of the user during the use of the car?

4. Did taking the test cause any embarrassment on the part of the user or cause any awkward incidents? If yes, please explain.

5. Did you notice any changes in the user's attitudes towards drunk driving from being in this program?

6. What impact did the use of the DDWS vehicle have on the user's life and life style?

7. Do you feel that this sanction is effective in deterring drunk driving?

8. If you had your choice of a sanction for a drunk driving offense would you select the DDWS program over other sanctions?

9. If you had a choice, how would you rank the following:

   a. Fine

   b. Jail sentence

   c. License restriction

   d. License suspension

   e. Rehabilitation or treatment program

   f. DDWS

   g. Other (community service, etc.)

10. What did user tell you about program, sanctions, system, etc.?

11. What was your reaction to the system and to the program?

3. COURT PERSONNEL DEBRIEFING

Name _____ Date _____

Position _____ Debriefer _____

Systems Technology, Inc. is in the process of evaluating the feasibility and effectiveness of the Drunk Driving Warning System. Because you have been involved with one portion of the overall feasibility evaluation, we are interested in your comments, suggestions, and reactions. All responses are confidential and are for STI use only.

1. What problems did you encounter in subject selection?

2. In the application of this sanction, what were the problems and what stage of implementation did they occur?

   a. Screening

   b. Referral

   c. Subject participation

   d. Follow-up

   e. Other _____

3. Did you experience any positive or negative reactions to subject selection and assignment or to the sanction from the following persons?

   a. Other court personnel

   b. Prosecuting attorneys

   c. Defense attorneys

   d. Offenders

   e. Law enforcement officers

   f. General public

4. Have there been any post sanction incidences with the offenders?

5. Would there be any difference between the voluntary application of this sanction and the assigned application of this sanction?

6. Should this sanction be used with any particular offenders?

7. Might this sanction be combined with other options?

8. How would you rank the effectiveness of this sanction as compared to other options?

   a. Fine

   b. Jail sentence

   c. License restriction

   d. License suspension

   e. Rehabilitation or treatment program

   f. DDWS

   g. Other (community service, etc.)

9. How do you rate the problems of implementing this sanction as compared to revocation? As compared to rehabilitation?

10. How would you suggest that this sanction be implemented?

11. Does this sanction act as a deterrence to drunk driving? Please explain.

12. What future work is needed on the DDWS concept and sanction before implementing it on a large scale by courts?

13. Do you have any other recommendations pertaining to this sanction?

14. What is the impact of this sanction on judicial processing? How does it affect:

    a. Plea bargaining

    b. Conviction rate

    c. Processing time

APPENDIX H

SUMMARY OF SUBJECT EXPERIENCE AND DEBRIEFING DATA

A. SUBJECTS

Participants for the DDWS program, were chosen according to the guidelines in Appendix E. In summary the conviction placing them in the program had to be their second for DWI, they had to be local (within 50 miles) to STI, and they had to have a continuing need for a car. If they met these basic criteria they could still be eliminated on the basis of their score on a psychological screening test (i.e., MMPI). In January of 1982 we were informed that we had until the end of the month to obtain the balance of our subjects. After that, DMV had no authority to restrict drivers licenses because the time period stated in our Assembly Bill would expire. At this point thirteen subjects had been selected and seven more were needed. Our options were, 1) Stop at thirteen subjects, 2) Have an amendment to the Bill ratified or 3) Get seven subjects in three weeks. We chose the third option. Because there is no central office in the Compton Court to process drunk drivers as there is in West Los Angeles, only two of the first thirteen subjects had come from Compton. In order to get the seven new subjects, project personnel went to the Compton Courts to screen potential subjects. Some of these remaining subjects might not have been accepted if more time were available, however, it was felt that they provided a thorough test of the DDWS concept.

B. CAR ASSIGNMENT

Before the car could be assigned to a subject, several conditions had to be satisfied as discussed in Appendix E. The subject had to go to the Department of Motor Vehicles and have his or her license restricted to the use of the DDWS car. A label was affixed to the driver's license and the DMV's computerized license system was updated to include the license restriction. Second, the subject had to obtain

liability insurance for the car. This was done with STI named as co-insured so that we would be notified in the event of cancellation. Finally, the subject returned to court to finalize his/her terms of probation. This process involved three offices and three sets of papers, and could become very involved. In spite of this, none of the subjects had any serious problems. A few subjects experienced minor problems that caused a few days delay.

C. THE DDWS CAR

The DDWS cars were 10 white 1978 Novas. They were required to have fee exempt license plates because they are owned by the federal government. This made them appear to be undercover police cars, and some subjects reported speeders slowing down on the freeway as they approached, etc. During the alarms-on phase of the experiment, the subjects had to pass the CTT test in order to deactivate the flashing hazard lights. They had four tries to pass and depending on which trial they passed, they could spend up to five minutes sitting in the car with the hazard lights flashing. Subjects reported this making them feel very self-conscious, especially at night when the flashing lights were most conspicuous. Subjects were required to keep a log book and make a note of each trip.

D. PROGRAM

The experimental design and procedures for the field test are given in detail in Appendix F. The first two weeks after car assignment was the baseline period where the subject drove the car with no alarms and was not required to take a test. Training took place during the second two weeks. There were three training sessions, each requiring 100 trials on the CTT. In general, test performance, as measured by CTT scores, was much higher during the training phase than during the rest of the program. The training levels were based on an hour's worth of concentrated CTT performance, and it is unreasonable to assume that a subject could manage this kind of performance at 7:00 a.m. when, for example, he has to drive his child to school. The pass scores generally

ended up 0.3 below the immediate post training level (individual subject performance is given in Appendix I.

After the subjects completed their six month period with the car, they underwent a debriefing interview. They were also handed a letter of completion to take to court. It was stressed that the final interview was for research purposes only, that anything said would be held in strict confidence, so that they should be as candid as possible.

E. PROBATION VIOLATIONS

The design of the DDWS field test evaluation (Appendix D) attempted to anticipate all the various types of probation violations that might occur. All anticipated major violations were planned for, and proper channels were provided for disposition. There were, however, many minor infractions that had to be dealt with on an ad hoc basis. The probation violations fell into 3 categories: 1) Flagrant violations that required immediate notification of the courts; 2) Violations that were suspected, but unconfirmed, and 3) Potential technical violations that resulted in valuable research information and went unreported.

The first category of violations included those that endangered STI's commitment to the courts or could potentially undermine our research. In these cases we notified the court immediately by phone and decided on an appropriate course of action. There was usually a follow-up letter. Violations in this category included: Subject 07 putting off her training appointment, Subject 13 driving his own car and Subject 19 driving with the alarms on. The other instances causing courts notification were: 1) Subject 18 being arrested with illegal fireworks, 2) Determination that Subject 21 actually had three arrests for DWI, and 3) Subject 23 never responding to our notices to begin the program. These three subjects were eventually dropped from the study. (For detailed case histories, see Appendix I.)

The second category of violations included those that were suspected, but unconfirmed. When asked about a failure the subject would respond that he or she was just "testing" the system with no intention

of driving. Nowhere in the Terms of Probation or in STI's supplementary set of rules does it say the subject is not to test the system. Subject 10 also claimed that he never drove another car. The data showed that he did not drive for 11 days. He was at home, not on vacation, and maintained his Toyota in operating condition. The subjects paid STI a mileage fee for use of the car and they paid for their own gas. It seems highly likely that this subject could have been tempted to drive his Toyota for economic reasons. There was no action taken against these subjects because there was no proof of probation violation. We did remind them that our data were available to the courts and they should be prepared to explain their actions under oath. Both of these incidents, "testing" and not driving for extended periods, demonstrate cases where we might put a different interpretation on the data than the one the subject is trying to convey.

The third category consisted of potential violations. These were distinguished from the above situations only by the subjects verbal behavior. That is, where the subjects in Category 2 declare they were "only testing," the subjects in the third category admit they failed because they were drinking and went on to explain whether they waited and passed, walked home, got a ride, etc. These incidents were not violations of the probationary agreements. However, had the subject passed the test he or she would have driven. At that point there would have occurred an undetected violation.

F. IN DEPTH ANALYSIS

As explained above, the subjects were very open and honest with us and their own reports in many cases provided the basis for distinguishing the impaired data from the sober data. The following definitions were used during the biweekly check-ins in order to review subject "quick look" analysis data, and question subjects about suspicious episodes. In Section IV.D note, however, that use was made only of the data classified as problem failures in category four below. The different modes of test failure were defined as follows.

1. Deterred Drives

A deterred drive was defined as one or more test failures without the car being driven. Deterred drives were assumed to be due to subject impairment unless one of the three categories below were indicated through examination of the quick look data, subject log and subject debriefing.

2. Impaired Failure

Data for these failures fell into three categories:

a) Subject candidly admitted to an impaired failure when questioned during debriefing at a two week check-in session. These failures were always defined as a DDWS deterred drive.

b) One or more test failures over a given period of time (the subject must wait 10 minutes before the test can be retaken) without the subject admitting to impairment (i.e., they offered a variety of other excuses) -- these instances were almost always defined as deterred DDWS drives except in a few extenuating circumstances where the time of day and circumstances surrounding the test environment may have caused a sober failure.

c) One or more test failures followed by a pass and the subject did not admit to impairment -- in these cases we considered the score levels, time of day, time between attempts and condition of the log book to determine if the failures amounted to deterred drives (note that if a subject tries the test repeatedly over a several hour period he may sober up enough in order to subsequently pass the test) -- low scores, long times between attempts (say > 1/2 hour), evening hours, and either missing or garbled log book entries would be used to make a judgement as to whether the test failure was due to impairment.

3. Sober Failure

Sober failures were determined on the basis of CTT scores, logbook comments and debriefing questions as discussed above. If a subject failed 4 trials, waited 10 minutes, and then passed by a high margin, it was assumed he was sober. The 10 minute waiting period was chosen because it's possible for the subject to calm down, or wake up while it is highly unlikely that he/she could sober up in this time.

4. Problem Failure

Problem failures were usually indicated when the 10 minute waiting period occurred, but the subject did not get four trials. This could be due to turning the engine off by mistake, getting out of the car, or a problem with the system. Faulty seat switches caused a few of these failures, as did worn out steering potentiometers. However, they usually occurred because the subject was not used to the subtleties of the system.

G. FINAL DEBRIEFING COMMENTS

The information gathered in the final debriefings shows that the subjective impressions of all the participants were very similar. Responses are summarized in Table H-1. Everyone, 18 out of 18 respondents (Subjects 18 and 23 were not interviewed), said they thought the DDWS was effective in deterring drunk driving. When asked if they would choose to participate in the DDWS research project again under similar circumstances, knowing what they know now, they all said they would. All respondents were in agreement that there was no real hardship associated with their participation. The most adverse impact was suffered by the participant who lived in a neighborhood with no parking. He and his wife each had a car and parking the DDWS was a problem. This would not be a problem if the system were installed in the subject's car rather than having a replacement vehicle. Drives deterred because of drinking were never mentioned as a hardship. Sober failures were never mentioned in the final debriefing as an imposition. There were mild complaints, however, during the biweekly check-ins. It seems that the sober failures were accepted as part of the whole package. Eight participants reported no embarrassment, five were embarrassed at first only and five were said they were embarrassed continually.

Fourteen subjects said they never passed the test when they felt they were intoxicated. One man said he could pass after three beers, but not when he was intoxicated. Three of the 18 said they found four

TABLE H-1. SUBJECT STRUCTURED DEBRIEFING SUMMARY

SUBJECT	DID YOU PASS TEST WHILE INTOXICATED	DID YOU EVER USE ANOTHER CAR	DID YOU TELL FRIENDS, ETC. ABOUT DDWS	WERE YOU EMBARRASSED ABOUT DDWS	IS DDWS EFFECTIVE IN DETERRING DRUNK DRIVING	WOULD YOU DO IT AGAIN
01	No	Yes, when DDWS inoperative	Everyone	No	Yes, develop an awareness of number of drinks	Surely
05	No	Yes, when DDWS inoperative	8-15 in family 1 co-worker	Yes, at gas stations	Yes, can't drive unless sober	Yes
06	No	No	About 6 friends	No, too old to be embarrassed	Yes, in his case	Yes
07	No	No	Sister and 1 associate	Yes, very vain person	Yes	Yes
08	No (could pass after 3 beers	Drove truck around block 1/week to keep battery charged	Told everyone, even people on street	At first	Yes, because you can't drive	Yes
09	No	No	1 friend but she never saw it	Yes, at first then resigned to it	Yes	Yes
10	No	No*	Everyone except parents	Initially	Yes	Yes
11	No	No	Everyone	No	Yes	Yes
12	No	No	25-30 people	Yes	Yes	Yes

*Highly unlikely.

TABLE H-1. (CONTINUED)

SUBJECT	DID YOU PASS TEST WHILE INTOXICATED	DID YOU EVER USE ANOTHER CAR	DID YOU TELL FRIENDS, ETC. ABOUT DDWS	WERE YOU EMBARRASSED ABOUT DDWS	IS DDWS EFFECTIVE IN DETERRING DRUNK DRIVING	WOULD YOU DO IT AGAIN
13	Yes, after 4 beers	Yes, got a ticket $350	About 15	Not really, (Probably at Navy base)	Yes	Yes
14	Yes, 4 glasses was borderline	No	Everyone	At first, "grew to love car"	Yes	Yes
15	No	No	Everyone	Yes - special exempt license plates	Yes	Yes, "Easy way out"
16	No	No	Just one	No	Yes, its intimidating	Yes
17	No	No	Lots (every-one)	No	Yes	Yes
19	No	No	About 10	At first	Yes	No doubt
20	No	No	Everyone	Yes, special exempt license plates caused dirty looks	Yes	Yes
21	Yes, 6-8* screw-drivers + a couple six packs	No	Everyone	Not really	Basically	Yes
22	No	No	Everyone	No, maybe when someone wanted parking space	Yes	Yes, Definitely

*This is very far fetched.

TABLE H-1. (CONTINUED)

SUBJECT	HOW WOULD YOU RATE HARDSHIP OF DDWS	WHAT CHANGES WOULD YOU RECOMMEND	HOW DID PASSENGERS REACT?	ATTITUDES TOWARD DRINKING AND DRIVING	CAN DDWS PERMANENTLY TEACH DRIVER WHEN IMPAIRED	ORDER OF SANCTION PREFERENCE*	MISCELLANEOUS COMMENTS
01	Pain in the neck, less than jail and AA meetings, more constructive than other options	Use after 1 arrest; No flashing lights; use more widely	Curious, they thought he was lucky	More cautious driving; drinking frequency same	Have to wait and see	f,a,c,e,d,b	Considers himself a social drinker.
05	Medium	Have more reliable cars No flashing lights	He ignored them	Drinks less; drives less; will drive more without DDWS	Yes	f,c,a,e,d,b	His wife thought he was lucky.
06	A breeze	Didn't like MMPI	Curious	Drinking same driving same no drink/drive	Yes	f,e,d,c,a,b	His friend says they don't go to bars on the way home
07	Not that much	Need to be widely advertised	Questions	Drives and drinks less	Yes, car lets you know	f,c,e,a,d,b	Said it was company car
08	Easiest and most effective	None	Interested, wanted to watch	Drinks less; drives same; permanent effect	Yes	f,e,c,b,d,a	Whole life calmed down. Not as much drinking
09	Most palatable	None, well run	Indifferent	Doesn't drink	Could	f,e,c,d,b,a	Called later to say he would be a spokesman for system
10	None	Cars should not be white (reflection)	Curious	Drinks less	Yes	f,d,e,c,a,b	—
11	No hardship	None	Wanted to try it	Same, more cautious	Yes	f,e,a,c,d,b	People thought it was a breath test
12	Less hardship than others	Better training explanation	Daughter embarrassed	Drinks less	No, need the car as feedback	f,e,a,c,d,b	No flashers

*a = Fine
b = Jail
c = License Restriction
d = License Suspension
e = Rehabilitation
f = DDWS

TABLE H-1. (CONCLUDED)

SUBJECT	HOW WOULD YOU RATE HARDSHIP OF DDWS	WHAT CHANGES WOULD YOU RECOMMEND	HOW DID PASSENGERS REACT?	ATTITUDES TOWARD DRINKING AND DRIVING	CAN DDWS PERMANENTLY TEACH DRIVER WHEN IMPAIRED	ORDER OF SANCTION PREFERENCE*	MISCELLANEOUS COMMENTS
13	Minimal	Used more widely	Thought it was a computer game	Drinks less	Maybe, will have to see	f,e,c,a,d,b	--
14	No hardship at all	No flashing lights	Disbelief	Drinks less because of feedback	Car makes you keep track	f,e,b,c,d,a	Friend/bar owner was enthusiastic about DDWS.
15	Not bad, fine would have less	Consistency of test	Thought it was a kick	Drives less; quit drinking	Can't say	a,f,c,e,d,b	Stopped drinking favored rehabilitation
16	Least restrictive	Better indoctrination program	Thought it was amusing	Drinks less at lunch because of car	Could be	a,f,c,e,d,b	DDWS should continuously monitor performance
17	None	None	Did not say anything	Drinks less	Yes	f,e,c,a,d,b	--
19	None; only inconvenient when when hurrying	None	Thought it was a tachometer and he was a cop	Drove more, drinks less‡ he was not used to a good car	Yes	f,a,c,e,d,b	--
20	Not much, got used to it	None	Thought it was PAC MAN game	Does not drink anymore	Yes	f,c,a,e,d,b	--
21	No problem	Lights are distracting	Curious	Drinks less drives same	Yes, you have to pace yourself		Takes girlfriend's car to parties, subject dropped after 2 months
22	No hardship	None	Interested and excited, wanted to try it	Drinks less	Yes	f,e,c,a,d,b	Said he would speak for program

*a = Fine
b = Jail
c = License Restriction
d = License Suspension
e = Rehabilitation
f = DDWS
‡ = Questionable

drinks to be their borderline. Sometimes they could pass and sometimes they couldn't. Three out of 18 admitted driving another vehicle. Two of these incidents were because the DDWS car was inoperative because of a mechanical problem and no drinking was involved. The other incident was related by Subject No. 8. He had gone to a party with his girlfriend, in her car, because of the DDWS. She got very drunk and he drove home. Subject 13 drove his own car on one occasion and got a ticket (see Subject 13's case history in Appendix I).

We asked the subjects if they had ever wanted to circumvent the system or if they had ever actually tried to. Most of them admitted they wanted to, usually after a sober failure. No one indicated they ever actually tampered with the system or tried to disable it in any way. This corresponds to our check-in records -- there were no broken seals or evidence of tampering on the computer tapes.

Nine participants told everyone about the system including people on the street. Subject 8 drove to Louisiana and said everyone was very interested. One man told everyone except his parents. Five people told a few friends and relatives. One woman told her sister and one business associate and didn't tell her husband. Two subjects told only one friend. The subjects related that passengers were either curious (7), wanted to try it (4), amused (2) or ignorant (5).

We asked for recommendations regarding the implementation of the program. The subjects <u>all</u> wanted to be able to take the test without the flashing lights. It was suggested that the cars not be white because the reflection makes it difficult to see the CTT meter. One man suggested a mirrored window on the drivers side so that the test could be taken privately. This may seem petty, however, people watching was the most frequently cited reason for sober failures. Other suggestions included wider availability of the program, i.e., advertising, after the first arrest, etc. Two subjects felt that our program and training orientations for the subject were inadequate.

We asked about changes in the subjects attitudes and behavior relative to driving and drinking. All 18 stated that they don't drive after

drinking anymore. (It must be mentioned, however, that they do not consider 2 or 3 beers "drinking"). Three said their attitude toward drinking and their drinking behavior was the same as before DDWS. Fifteen report that they drink less or not at all. Most of these attributed this to the feedback of the car. Some, however, said the car had nothing to do with it, it was because of the consequences of a third arrest. Nine people said their driving frequency was not changed by the car. Six said they drive less, plan trips, and used more drive-through services. They thought these changes would probably be temporary. Two subjects actually drove more because they were not accustomed to reliable transportation.

When asked if driving the DDWS car could permanently teach you to know when you are impaired, thirteen subjects said yes. Four subjects said maybe, we have to wait and see. One subject said no -- you have to have the feedback of the car.

APPENDIX I

SUBJECT CASE HISTORIES

A. OVERVIEW

This appendix contains detailed background and performance data on each of the experimental test subjects that participated in the field test evaluation part of this project. Specific incidences that are of importance in interpreting their experience in the program are also included. The plots of biweekly task performance data included herein, were developed in order to keep track of individual performance during each subject's six month participation pass levels and score standard deviations were generated from cumulative score distribution plots as discussed in Appendix G. Pass percentages were obtained from the online computer data reduction program also discussed in Appendix G. The biweekly task performance plots reflect working data that provided the basis for week to week decisions on pass levels. There may be discrepancies between these data and the completed project data base discussed in Section IV.

Differential score histograms were generated from the completed project data base at the conclusion of testing. Differential test score is defined as the average score over all trials occurring for a given usage minus the pass level for that usage. The histograms show failures or passes plotted according to time of day. The time periods are: 1) morning — 4 a.m. to 12 noon, 2) afternoon — 12 noon to 8 p.m., and 3) 8 p.m. to 4 a.m.

Subject rankings according to miles driven, number of trips, and test failure rate (failures ÷ total trips) are given in Figs. I-1, I-2, I-3. Fairly even distributions are noted for miles driven and number of trips. Test failure rate shows a large spread for a few subjects at the high end, however. This effect is further evident in the case history discussions below.

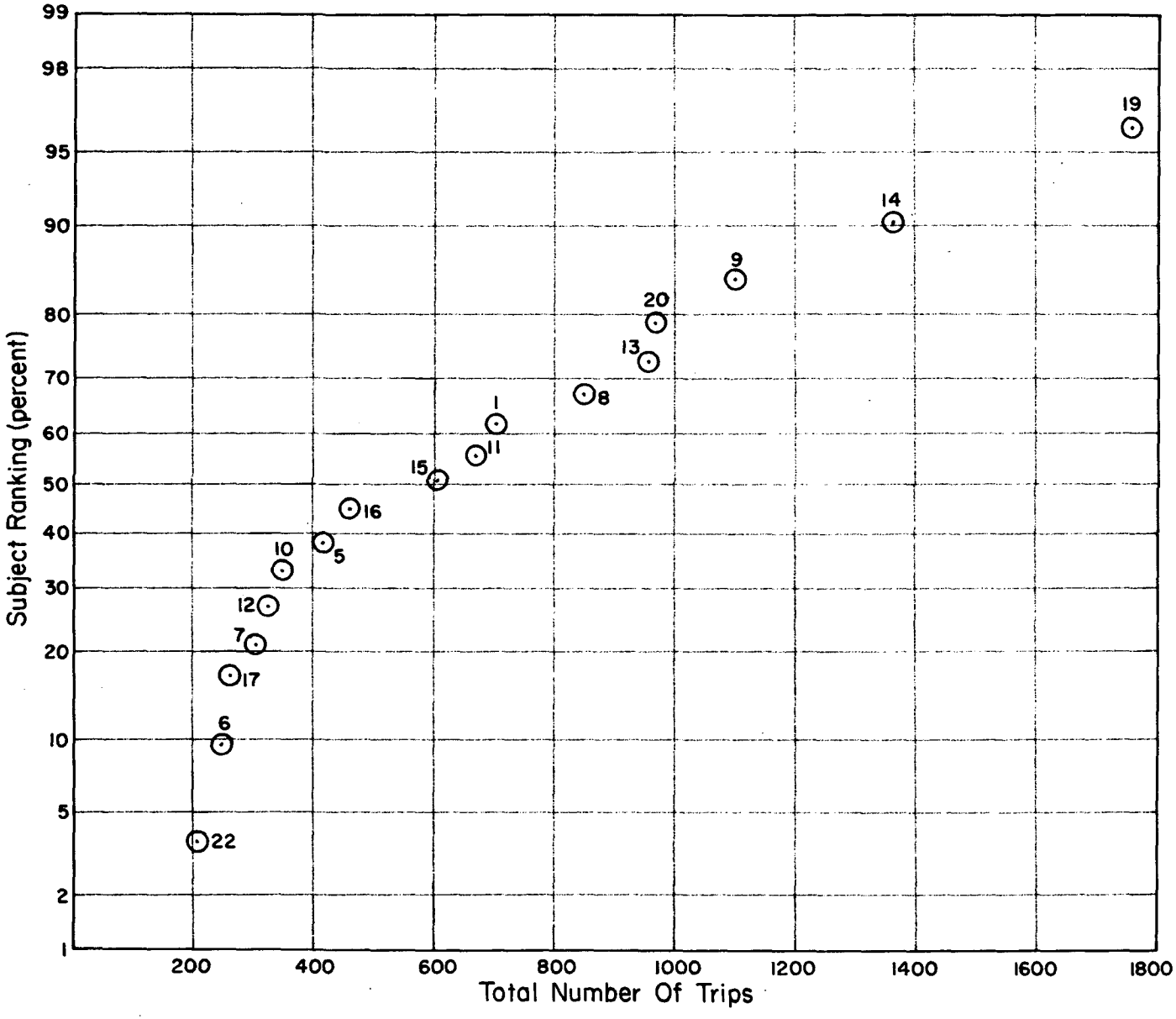


Figure I-1. Subject Ranking by Total Trips

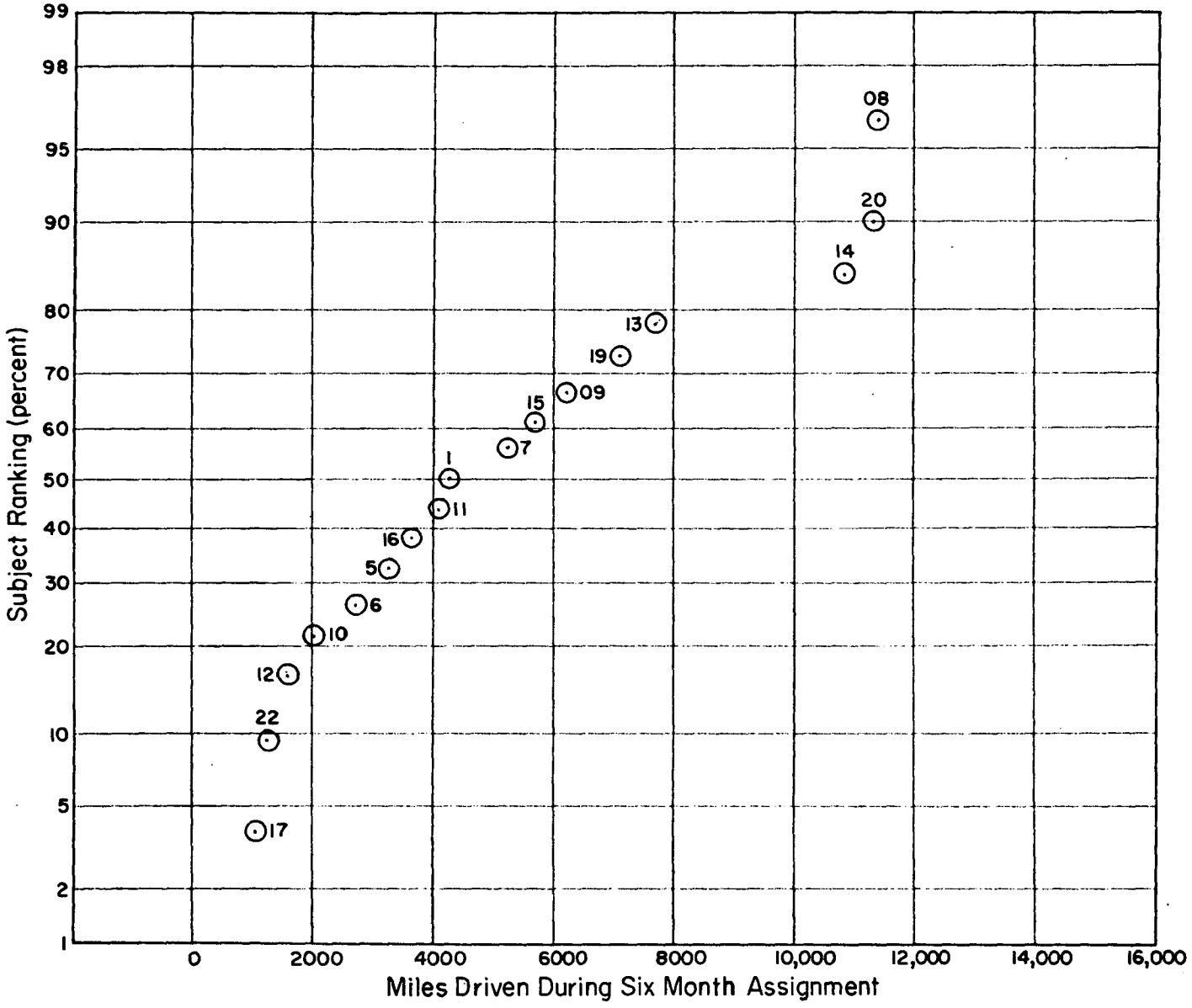


Figure I-2. Subject Ranking by Total Miles Driven

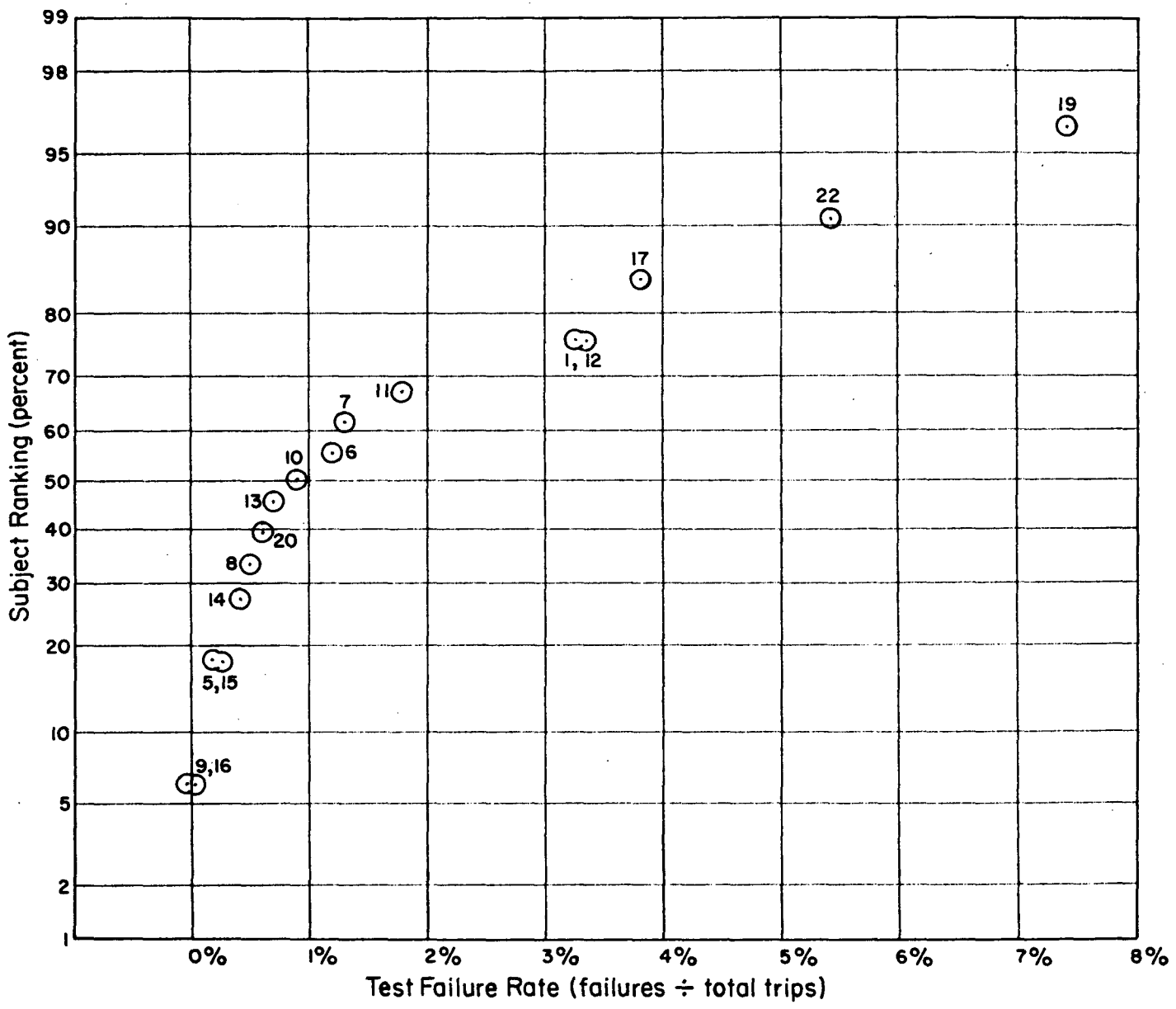


Figure I-3. Ranking of Subject Test Failure Rates

Subject 01

Subject 01 was 44 years old, not married and drove a 1980 Mercedes Turbo Diesel. He had an engineering degree which he did not use. He was with a company that breeds race horses and manages financial portfolios, and his car was an important part of his career. He discussed the possibility of installing his mobile phone in the DDWS/Nova, which he never did. He entertained clients and, as an explanation for driving a White Nova with "E" (exempt) license plates told them he was on the California Racing Board. During Phase 2 (alarms on) he kept notes in the log book of what he had to drink allowing us to correlate reported drinking with test performance.

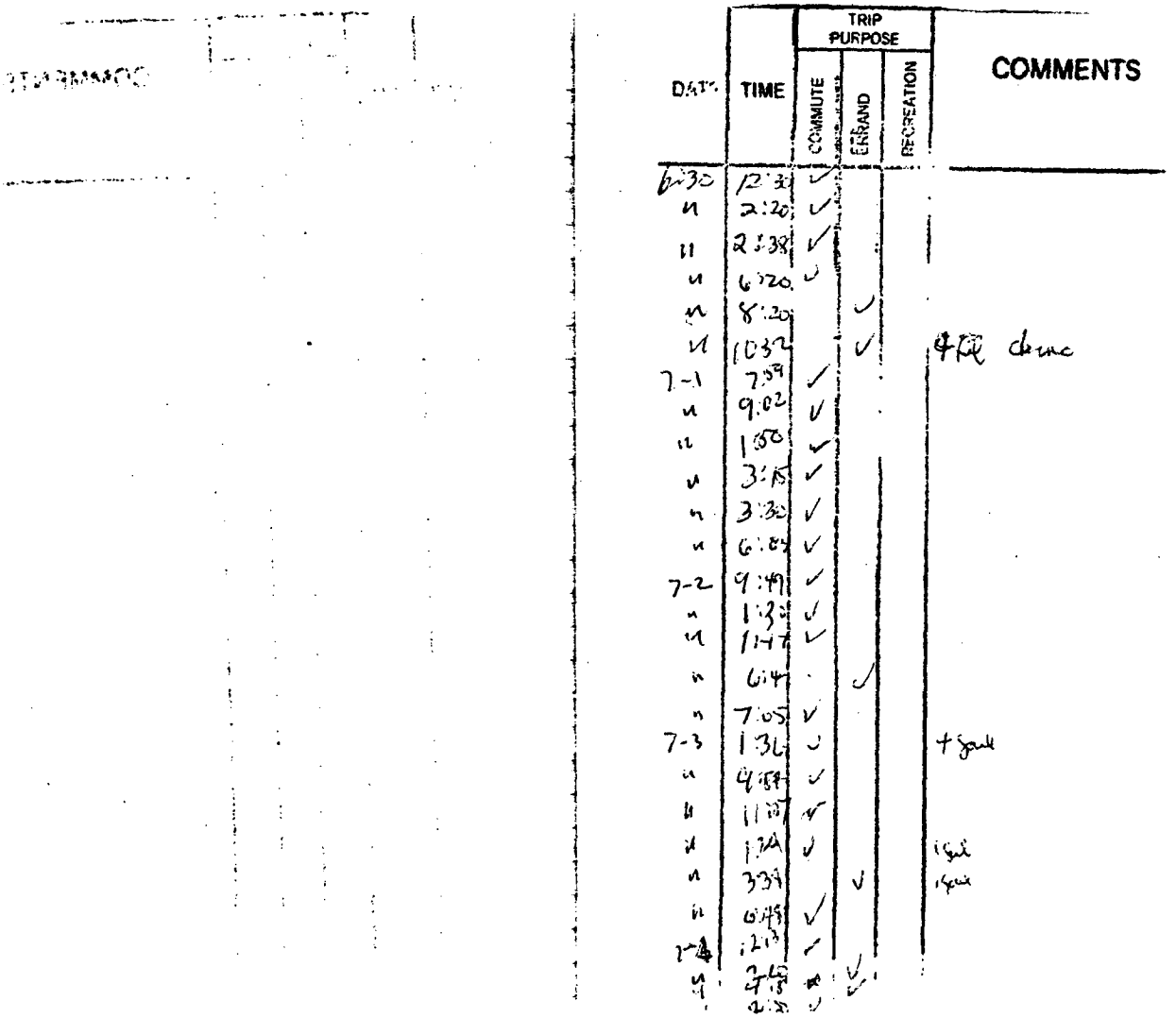
Figures I-4, I-5, show examples of two sources of information used in assessing deterred drives vs. sober failures. On June 30 he noted in the logbook "4 fail demo." Figure I-4 shows how the data logger recorded the incident. In the biweekly debriefing, Subject 01 classified this incident as a sober failure. We interpret it to be a deterred drive since he could not pass the test and he had been drinking. On July 3 at 1:36 a.m. he had another failure. This is clearly a deterred drive, with the subject requiring a ride home from his friend. Subject 01 admitted to test failures after drinking in his check-in debriefings, and all in all was quite candid about his DDWS experience.

During his last two weeks the alternator went bad on his DDWS/Nova and the battery kept dying. This accounts for the elevated standard deviations for check-ins 8-10 (Fig. I-6). The CTT pass level was obtained from the reliable scores in the biweekly CTT score distribution and can remain stable in spite of some low scores indicating an impending equipment breakdown. Such low scores will of course affect the standard deviation. It came out in the final debriefing that he drove his own car during this period. He drove 4,211 miles and had 36 test failures, 24 which were identified with impairment. Miles driven and number of trips were average for this subject, however, his deterred drive frequency was high.

Biweekly check-in data (Fig. I-6) shows fairly stable performance with a slight learning trend over the alarms active phase of the experiment. The differntial score histograms in Fig. I-7 show trips spread out over morning, afternoon, and evening periods, with test failures occurring primarily in the afternoons and evenings.

12	3	14.6592	29	29	5.0	0.3	D	7		2:39P	JUN	30	81	2	1	1
12	3	14.7036	189	160			B	2		2:42P	JUN	30	81	2	1	1
12	3	18.3156			4.7		A-1----			6:18P	JUN	30	81	2	1	1
12	3	18.3258	37	37	5.5	0.8	D	7		6:19P	JUN	30	81	2	1	1
12	3	18.3872	258	221			B	2		6:23P	JUN	30	81	2	1	1
12	3	20.3386			4.7		A-1----			8:20P	JUN	30	81	2	1	1
12	3	20.3564	64	64	4.8	0.1	D	79		8:21P	JUN	30	81	2	1	1
12	3	20.4261	315	251			B	2		8:25P	JUN	30	81	2	1	1
12	3	22.3833			4.7		A-1----			10:23P	JUN	30	81	2	1	1
12	3	22.3894	22	22	3.8	-0.9	D	49		10:23P	JUN	30	81	2	1	1
12	3	22.4025	69	47	3.9	-0.8	D	49	Showing	10:24P	JUN	30	81	2	1	1
12	3	22.4111	100	31	4.1	-0.6	D	49	car to a	10:24P	JUN	30	81	2	1	1
12	3	22.4256	152	52	4.3	-0.4	D	49	friend	10:25P	JUN	30	81	2	1	1
12	3	22.5992	777	625			B	2		10:35P	JUN	30	81	2	1	1
12	4	7.9881			4.7		A-1----		had been	7:59	JUL	1	81	2	1	1
12	4	7.9969	32	32	4.3	-0.4	D	49		7:59	JUL	1	81	2	1	1
12	4	8.0094	77	45	5.0	0.3	D	79	drinking	8: 0	JUL	1	81	2	1	1
12	4	8.1131	450	373			B	2	(a test)	8: 6	JUL	1	81	2	1	1
12	4	9.0383			4.7		A-1----		DD	9: 2	JUL	1	81	2	1	1
12	4	9.0478	34	34	5.0	0.3	D	79		9: 2	JUL	1	81	2	1	1
12	4	9.1425	375	341			B	2		9: 8	JUL	1	81	2	1	1
12	4	13.8367			4.7		A-1----			1:50P	JUL	1	81	2	1	1
12	4	13.8497	47	47	5.1	0.4	D	79		1:50P	JUL	1	81	2	1	1
12	4	13.9711	484	437			B	2		1:58P	JUL	1	81	2	1	1
12	4	15.2536			4.7		A-1----			3:15P	JUL	1	81	2	1	1
12	4	15.2703	60	60	5.3	0.6	D	79		3:16P	JUL	1	81	2	1	1
12	4	15.3919	498	438			B	2		3:23P	JUL	1	81	2	1	1
12	4	15.4978			4.7		A-1----			3:29P	JUL	1	81	2	1	1
12	4	15.5075	35	35	5.2	0.5	D	7		3:30P	JUL	1	81	2	1	1
12	4	15.7081	757	722			B	2		3:42P	JUL	1	81	2	1	1
12	4	18.0525			4.7		A-1----			6: 3P	JUL	1	81	2	1	1
12	4	18.0656	47	47	5.4	0.7	D	79		6: 3P	JUL	1	81	2	1	1
12	4	18.1217	249	202			B	2		6: 7P	JUL	1	81	2	1	1
12	5	9.8300			4.7		A-1----			9:49	JUL	2	81	2	1	1
12	5	9.8422	44	44	4.9	0.2	D	79		9:50	JUL	2	81	2	1	1
12	5	9.9097	287	243			B	2		9:54	JUL	2	81	2	1	1
12	5	13.5017			4.7		?A-1----			1:30P	JUL	2	81	2	1	1
12	5	13.5250	84	84	4.8	0.1	D	79		1:31P	JUL	2	81	2	1	1
12	5	13.7356	842	758			B	2		1:44P	JUL	2	81	2	1	1
12	5	13.8706			4.7		A-1----			1:52P	JUL	2	81	2	1	1
12	5	13.8828	44	44	5.5	0.8	D	79		1:52P	JUL	2	81	2	1	1
12	5	13.9808	397	353			B	2		1:58P	JUL	2	81	2	1	1
12	5	18.8739			4.7		A-1----			6:52P	JUL	2	81	2	1	1
12	5	18.8897	57	57	4.8	0.1	D	7		6:53P	JUL	2	81	2	1	1
12	5	18.9428	248	191			B	2		6:56P	JUL	2	81	2	1	1
12	5	19.0942			4.7		A-1----			7: 5P	JUL	2	81	2	1	1
12	5	19.1042	36	36	4.0	-0.7	D	49		7: 6P	JUL	2	81	2	1	1
12	5	19.1136	70	34	5.1	0.4	D	7		7: 6P	JUL	2	81	2	1	1
12	5	19.1480	194	124			B	2	DD	7: 8P	JUL	2	81	2	1	1
12	6	1.6000			4.7		A-1----			1:36	JUL	3	81	2	1	1
12	6	1.6100	36	36	4.5	-0.2	D	49	had been	1:36	JUL	3	81	2	1	1
12	6	1.6172	62	26	4.2	-0.5	D	49	previous	1:37	JUL	3	81	2	1	1
12	6	1.6247	89	27	4.0	-0.7	D	49	(wine)	1:37	JUL	3	81	2	1	1
12	6	1.6319	115	26	3.8	-0.9	D	49	friend dropped	1:37	JUL	3	81	2	1	1
12	6	1.8056	740	625			B	2		1:48	JUL	3	81	2	1	1
12	6	9.9067			4.7		A-1----		him off	9:54	JUL	3	81	2	1	1
12	6	9.9217	54	54	4.8	0.1	D	79		9:55	JUL	3	81	2	1	1
12	6	10.0194	406	352			B	2		10: 1	JUL	3	81	2	1	1
12	6	11.1267			4.7		A-1----			11: 7	JUL	3	81	2	1	1
12	6	11.1419	55	55	5.2	0.5	D	7		11: 8	JUL	3	81	2	1	1
12	6	11.2397	407	352			B	2		11:14	JUL	3	81	2	1	1
12	6	13.4992			4.7		A-1----			1:29P	JUL	3	81	2	1	1
12	6	13.5178	67	67	4.7	0.0	D	49		1:31P	JUL	3	81	2	1	1
12	6	13.5297	110	43	5.0	0.3	D	79		1:31P	JUL	3	81	2	1	1
12	6	13.9944	1783	1673			B	2		1:59P	JUL	3	81	2	1	1

Figure I-4. Excerpt from Event Log for Subject 01, Check-in No. 6



DATE	TIME	TRIP PURPOSE: COMMUTE	TRIP PURPOSE: ERRAND	TRIP PURPOSE: RECREATION	COMMENTS
6-30	12:3	✓			
"	2:20	✓			
"	2:38	✓			
"	6:20	✓			
"	8:20		✓		
"	10:32		✓		4th done
7-1	7:59	✓			
"	9:02	✓			
"	1:50	✓			
"	3:15	✓			
"	3:30	✓			
"	6:05	✓			
7-2	9:49	✓			
"	1:32	✓			
"	1:47	✓			
"	6:14		✓		
"	7:05	✓			
7-3	1:36	✓			+ Spell
"	9:59	✓			
"	11:07	✓			
"	1:20	✓			Spell
"	3:39		✓		Spell
"	6:45	✓			
7-4	2:10	✓			
"	7:45		✓		
"	2:35	✓			

Figure I-5. Sample Page from Log Book of Subject 01

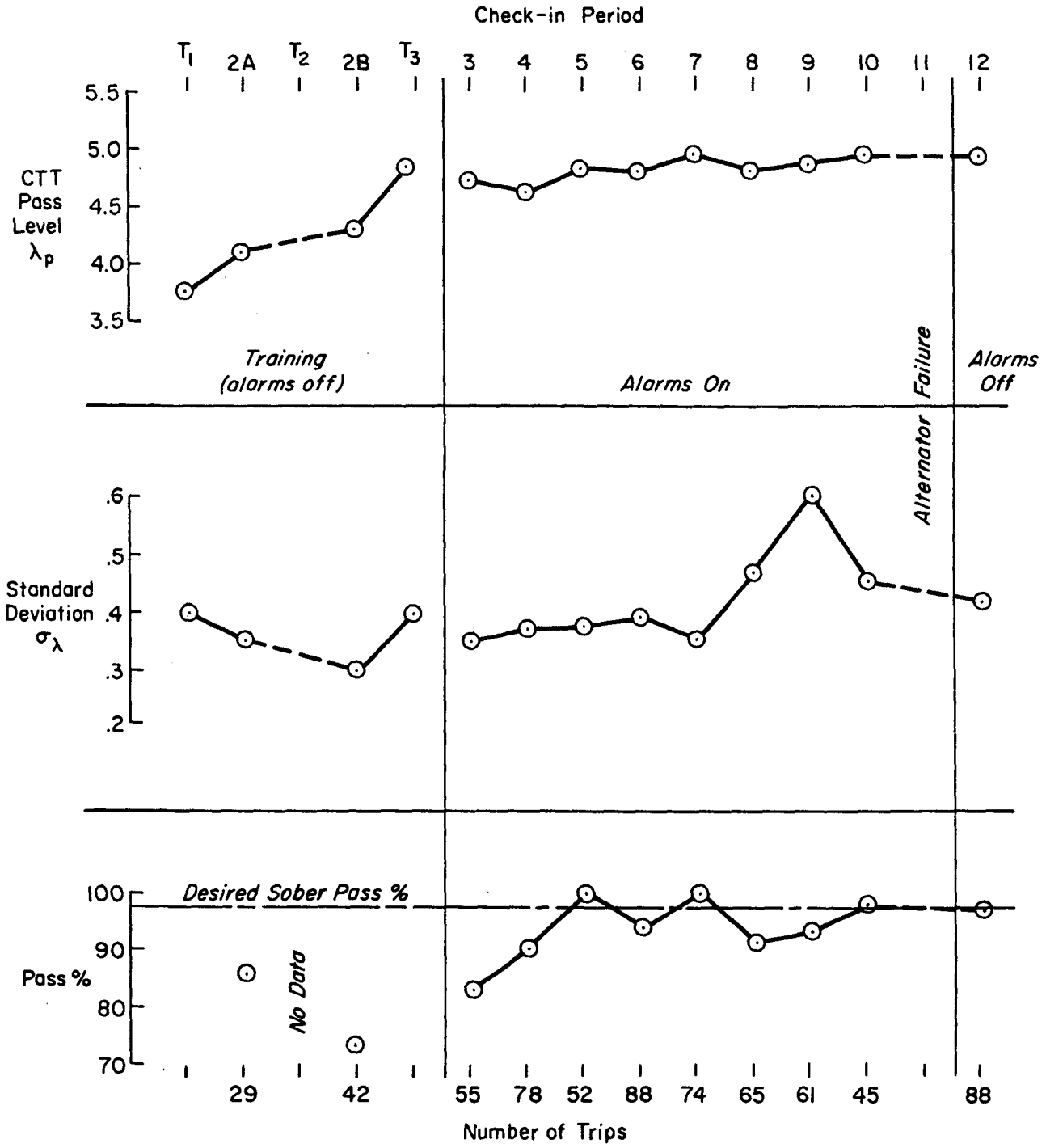
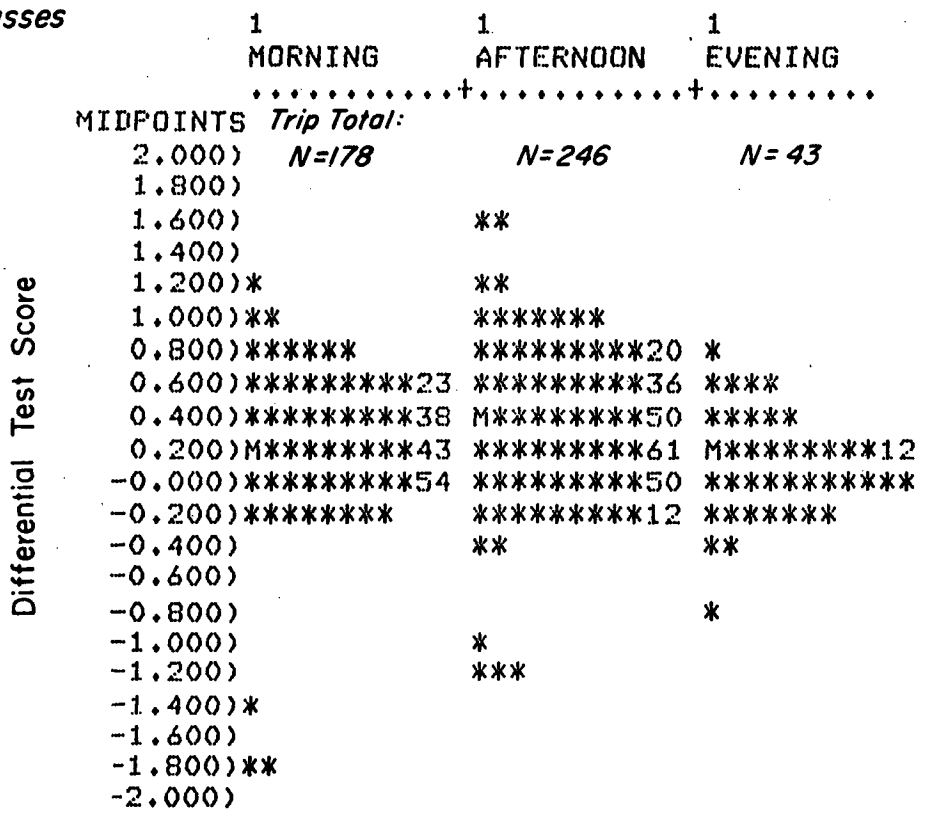


Figure I-6. Biweekly Performance Data for Subject 01

a) Passes



b) Failures

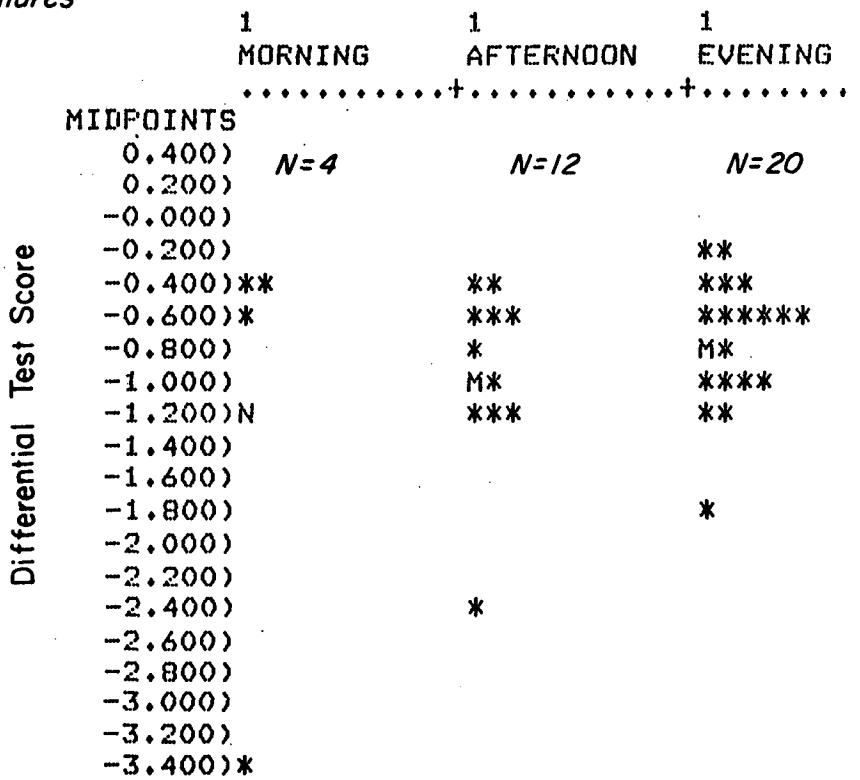


Figure I-7. Differential Test Score Histograms for Subject 01

Subject 05

Subject 05 was 25 years old, married, had one child and a puppy. He was concerned that taking the test with the dog on his lap would interfere with the seat sensor. He worked in a shipyard and left for work very early in the morning. He often failed the test at 6:30 a.m. He would then water the lawn for 10 minutes and try again. He had a tendency to not concentrate while taking the test. The steering potentiometer deteriorated and went undetected until it was completely nonfunctional because of his somewhat lax test performance*. In the final debriefing he admitted that he drove his own car during this period.

Figures I-8, I-9 show information regarding a deterred drive which occurred at 9:17 on a Friday night. There is no mention of the failure in the log book. Figure I-8 also shows an example of a problem failure. Figure I-10 shows very stable performance during the alarms on period (aside from the potentiometer failure period) with a very slight learning trend. He did not feel well during his first training period so he quit early. At his second session he had to make up the missed trials from the 1st session. This may have contributed to the erratic training curve and the subsequent learning slight as it was.

While in the program Subject 05 drove to and from work and had his wife drive at all other times. His own vehicle was a 1978 Toyota truck. He drove 3,221 miles during the 6 month period and had 20 test failures, 6 of which were assumed due to impairment. His driving behavior was average as far as miles driven and number of trips. His deterred drive frequency was one of the lowest, possibly due to the fact that his wife did most of the driving during the normal drinking hours. The histograms in Fig. I-11 show little evening driving and failures occurring primarily in the mornings and afternoons.

*The steering potentiometers could deteriorate progressively. This process would start by the output failing over some narrow steering sector. This sector would then enlarge, or other dead sectors might appear. The test could still be taken within good sectors, however.

```
7 7 20.3519              4.0          A-1----      8:21P JUN 13 81 2  5 5
7 7 20.3628   39   39      3.8 -0.2 D   4         8:21P JUN 13 81 2  5 5
7 7 20.3692   62   23      3.7 -0.3 D   4         8:22P JUN 13 81 2  5 5
7 7 20.3844  117   55      4.4  0.4 D   7         8:23P JUN 13 81 2  5 5
7 7 20.8150 1667 1550                B  2         8:48P JUN 13 81 2  5 5
8 1  8.9039              4.0          A-1----      8:54  JUN 14 81 2  5 5
8 1  8.9150   40   40      3.9 -0.1 D  49         8:54  JUN 14 81 2  5 5
8 1  8.9289   90   50      4.8  0.8 D  79         8:55  JUN 14 81 2  5 5
8 1  9.2347 1191 1101                B  2         9:14  JUN 14 81 2  5 5
8 1 21.2850              4.0          A-1----      9:17P JUN 14 81 2  5 5
8 1 21.2936   31   31      3.5 -0.5 D  49         9:17P JUN 14 81 2  5 5
8 1 21.3014   59   28      3.9 -0.1 D  49         9:18P JUN 14 81 2  5 5
8 1 21.3078   82   23      3.7 -0.3 D  49         9:18P JUN 14 81 2  5 5
8 1 21.3147  107   25      3.2 -0.8 D  49         9:18P JUN 14 81 2  5 5
8 1 21.4883  732  625                B  2         9:29P JUN 14 81 2  5 5
8 1 21.4925              4.0          A-1----      9:29P JUN 14 81 2  5 5
8 1 21.4989   23   23      3.3 -0.7 D  49         9:29P JUN 14 81 2  5 5
8 1 21.5086   58   35      4.2  0.2 D  79         9:30P JUN 14 81 2  5 5
8 1 21.8664 1346 1288                B  2         9:51P JUN 14 81 2  5 5
8 2  6.3622              4.0          A-1----      6:21  JUN 15 81 2  5 5
8 2  6.3631    3    3                B  2         6:21  JUN 15 81 2  5 5
8 2  6.3697              4.0          A-1----      6:22  JUN 15 81 2  5 5
8 2  6.3761   23   23      4.5  0.5 D   7         6:22  JUN 15 81 2  5 5
8 2  6.7722 1449 1426                B  2         6:46  JUN 15 81 2  5 5
```

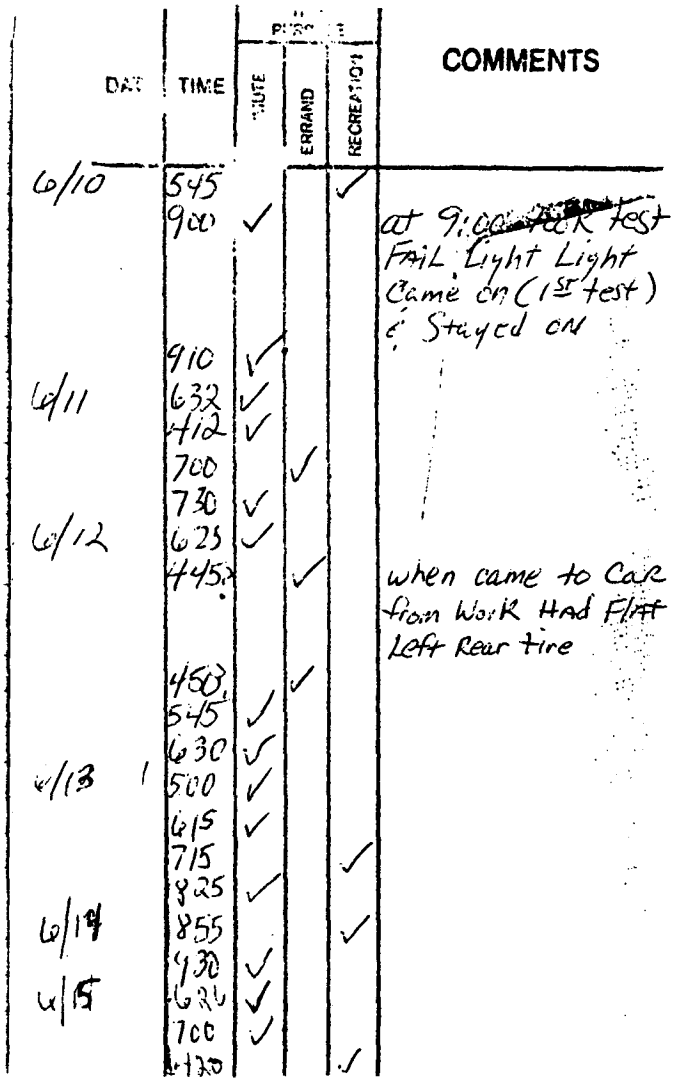
3 beeps DL

```
8 6  7.4617              4.0          A-1----      7:27  JUN 19 81 2  5 5
8 6  7.4992  135  135                 B  2  <---   7:29  JUN 19 81 2  5 5
8 6 16.1628              4.0          A-1----      4: 9P JUN 19 81 2  5 5
8 6 16.1758   47   47      3.6 -0.4 D  49         4:10P JUN 19 81 2  5 5
8 6 16.1903   99   52      3.7 -0.3 D  49         4:11P JUN 19 81 2  5 5
8 6 16.3847  799  700      4.0  0.0 D  49         4:23P JUN 19 81 2  5 5
8 6 16.3978  846   47      4.7  0.7 D  79         4:23P JUN 19 81 2  5 5
8 6 16.6392 1715  869                B  2         4:38P JUN 19 81 2  5 5
8 6 18.4419              4.0          A-1----      6:26P JUN 19 81 2  5 5
8 6 18.4553   48   48      3.6 -0.4 D  49         6:27P JUN 19 81 2  5 5
8 6 18.4733  113   65      4.8  0.8 D  79         6:28P JUN 19 81 2  5 5
8 6 18.6167  629  516                B  2         6:37P JUN 19 81 2  5 5
8 6 20.2411              4.0          A-1----      8:14P JUN 19 81 2  5 5
8 6 20.2508   35   35      3.8 -0.2 D   4         8:15P JUN 19 81 2  5 5
8 6 20.2650   86   51      4.1  0.1 D  79         8:15P JUN 19 81 2  5 5
8 6 20.3994  570  484                B  2         8:23P JUN 19 81 2  5 5
8 6 20.5692              4.0          A-1----      8:34P JUN 19 81 2  5 5
8 6 20.6094  145  145                 B  2  <---   8:36P JUN 19 81 2  5 5
9 2  6.4589              4.0          A-1----      6:27  JUN 22 81 2  5 5
9 2  6.4700   40   40      4.4  0.4 D   7         6:28  JUN 22 81 2  5 5
9 2  7.0475 2119 2079                B  2         7: 2  JUN 22 81 2  5 5
9 2 16.1792              4.0          A-1----      4:10P JUN 22 81 2  5 5
9 2 16.3542  630  630                 B  2  <---   4:21P JUN 22 81 2  5 5
9 2 16.8344              4.0          A-1----      4:50P JUN 22 81 2  5 5
9 2 16.8430   31   31      4.5  0.5 D  79         4:50P JUN 22 81 2  5 5
9 2 17.1492 1133 1102                B  2         5: 8P JUN 22 81 2  5 5
9 2 17.2733              4.0          A-1----      5:16P JUN 22 81 2  5 5
9 2 17.2825   33   33      4.7  0.7 D   7         5:16P JUN 22 81 2  5 5
9 2 17.3108  135  102                 B  2         5:18P JUN 22 81 2  5 5
9 2 19.6517              4.0          A-1----      7:39P JUN 22 81 2  5 5
9 2 19.6589   26   26      4.3  0.3 D  79         7:39P JUN 22 81 2  5 5
9 2 19.7222  254  228                 B  2         7:43P JUN 22 81 2  5 5
9 2 19.8028              4.0          A-1----      7:48P JUN 22 81 2  5 5
9 2 19.8169   51   51      4.8  0.8 D   7         7:49P JUN 22 81 2  5 5
9 2 19.8506  172  121                 B  2         7:51P JUN 22 81 2  5 5
```

drove around alley

passenger opened door as taking test no test fail for 10 min

Figure I-8. Excerpts from Event Log for Subject 05, Check-in No. 4



DAY	TIME	PURPOSE: COMMUTE	ERRAND	RECREATION	COMMENTS
6/10	545			✓	
	900	✓			at 9:00 ~~Pack~~ test Fail Light Light came on (1st test) & Stayed on
	910	✓			
6/11	632	✓			
	412	✓			
	700		✓		
	730	✓			
6/12	625	✓			
	445?		✓		when came to Car from Work Had Flat Left Rear tire
	460		✓		
	545	✓			
	630	✓			
6/13	500	✓			
	615	✓			
	715			✓	
	825	✓			
6/14	855			✓	
	430	✓			
6/15	630	✓			
	700	✓			
	1120			✓	

Figure I-9. Sample Page from Log Book of Subject 05

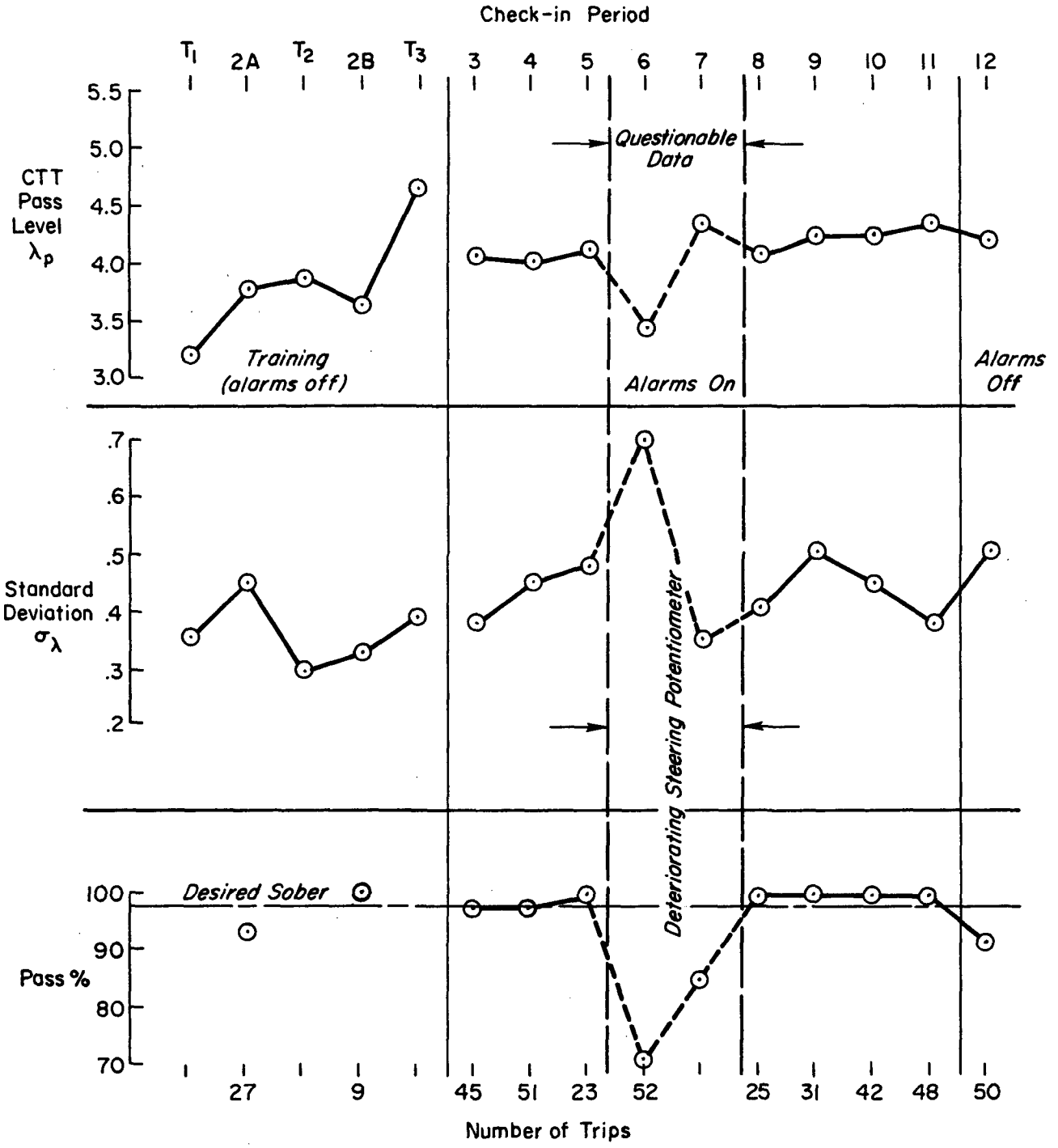
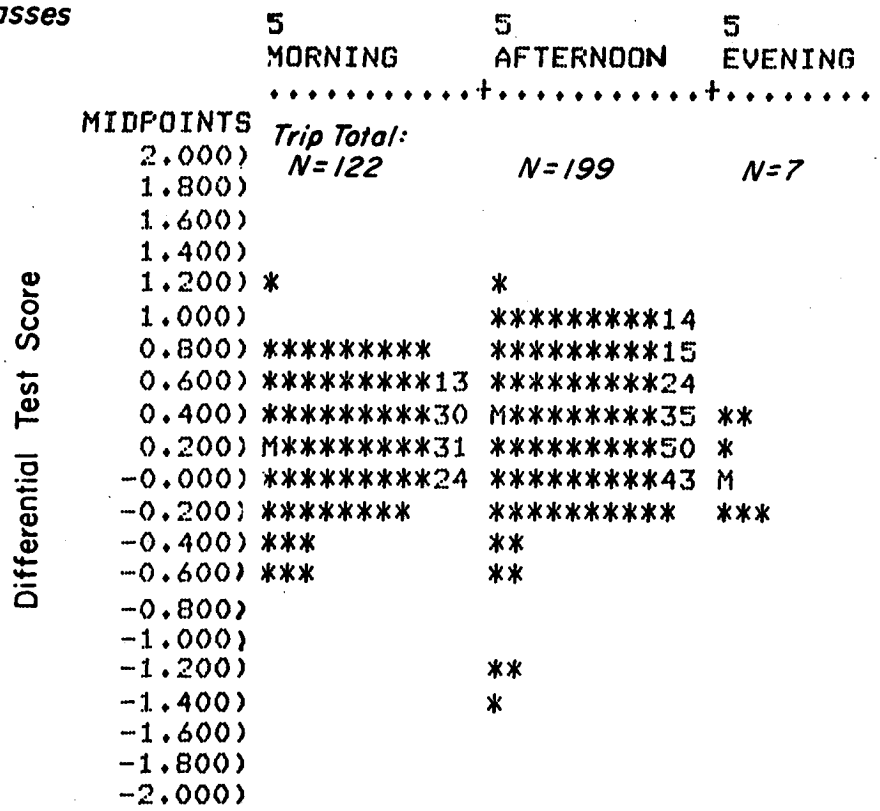


Figure I-10. Biweekly Performance Data for Subject 05

a) Passes



b) Failures

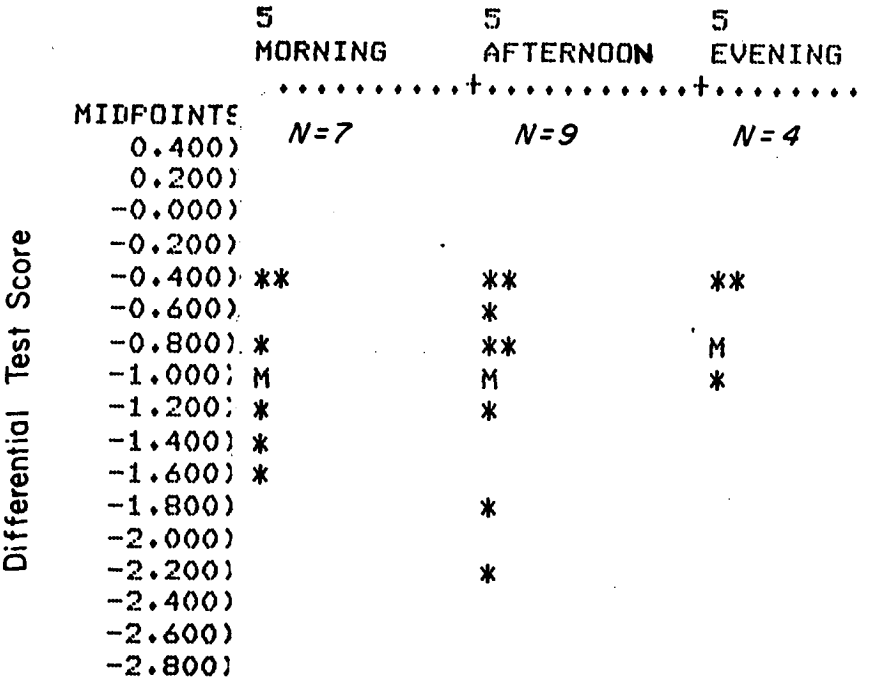


Figure I-11. Differential Test Score Histograms for Subject 05

Subject 06

Subject 06 was 35 years old and worked as a roofer. He drove a 1974 Jeep (canvas topped) and was concerned that the DDWS/Nova would not carry a second story ladder. On the days he needed the ladder, he car pooled with an associate who drove. At one point the system was allowing him as many trials as he needed to pass the test. He pointed this out to us immediately and the system was repaired. He would attempt to pass the test after drinking, and would report how much he drank in his log book. He did this 3 times which resulted in test failures. He was very much impressed by the consequences of a third arrest and never drove after drinking.

Figure I-12, I-13 show 2 sober failures, one of which occurred one morning on the day of his check-in at STI. In the first case he called his client and cancelled the appointment, in the second case he waited 20 minutes and then passed the test. Figure I-12 also shows an alarm test that was routinely carried out after each check-in to verify that the alarm system was in fact working. He once returned to what he thought was his car and was horrified to find the driver's side door smashed in. It turned out to be Subject 11's car, and she had coincidentally parked near him.

Subject 06 liked the DDWS equipped Nova, and volunteered to continue for another six months. He drove 2,706 miles in 6 months which put him on the low end of scale for miles driven. In his 9th check-in, his failure rate was 88.9 percent (Fig. I-14). This represents the 2 early morning sober failures in 2 weeks shown in Fig. I-12. Again, when the low number of trips is taken into account, the failure rate seems high. In spite of having only 5 test failures, Subject 06's low number of total trips (256) put him in the average range for deterred drive rate. Overall, Subject No. 06 had fairly stable performance and a slight learning trend over the alarms active period. Histograms in Fig. I-15 show no evening driving, and test failures mainly in the morning hours.

```
C>TYPE TEMP DATA

19 4 10.9033              4.3          A-1----      10:54  SEP 16 81 2  6 6
19 4 10.9186   55   55                 B  2         10:55  SEP 16 81 2  6 6
19 4 10.9511              4.3          A-1----      10:57  SEP 16 81 2  6 6
19 4 10.9614   37   37                 E  5         10:57  SEP 16 81 2  6 6
19 4 10.9706   70   33    4.1 -0.2 D   49           10:58  SEP 16 81 2  6 6
19 4 10.9775   95   25    4.2 -0.1 D   49           10:58  SEP 16 81 2  6 6
19 4 10.9953  159   64    4.9  0.6 D   79           10:59  SEP 16 81 2  6 6
19 4 11.6789 2620 2461    4.6  0.3 D   79           11:40  SEP 16 81 2  6 6
19 4 11.7714 2953  333                 B  2         11:46  SEP 16 81 2  6 6
19 7  9.5525              4.3          A-1----       9:33  SEP 19 81 2  6 6
19 7  9.5742   78   78    4.8  0.5 D   79           9:34  SEP 19 81 2  6 6
19 7 10.6250 3861 3783                 B  2        10:37  SEP 19 81 2  6 6
19 7 11.2992              4.3          A-1----      11:17  SEP 19 81 2  6 6
19 7 11.3828  301  301    4.3  0.0 D   49          11:22  SEP 19 81 2  6 6
19 7 11.3953  346   45    4.7  0.4 D   79          11:23  SEP 19 81 2  6 6
19 7 11.9578 2371 2025                 B  2        11:57  SEP 19 81 2  6 6
19 7 12.4869              4.3          A-1----     12:29P SEP 19 81 2  6 6
19 7 12.5083   77   77    4.9  0.6 D   79          12:30P SEP 19 81 2  6 6
19 7 12.9125 1532 1455                 B  2        12:54P SEP 19 81 2  6 6
20 2  8.1089              4.3          A-1----       8: 6  SEP 21 81 2  6 6
20 2  8.1267   64   64    4.0 -0.3 D   49           8: 7  SEP 21 81 2  6 6
20 2  8.1353   95   31    4.3  0.0 D   49           8: 8  SEP 21 81 2  6 6
20 2  8.1453  131   36    4.1 -0.2 D   49           8: 8  SEP 21 81 2  6 6
20 2  8.1511  152   21    3.5 -0.8 D   49           8: 9  SEP 21 81 2  6 6
20 2  8.3247  777  625                 B  2         8:19  SEP 21 81 2  6 6
20 3  7.8617              4.3          A-1----      7:51  SEP 22 81 2  6 6
20 3  7.8708   33   33    4.5  0.2 D   79          7:52  SEP 22 81 2  6 6
20 3  7.8911  106   73                 B  2         7:53  SEP 22 81 2  6 6
20 6  8.0581              4.3          A-1----      8: 3  SEP 25 81 2  6 6
20 6  8.1111  191  191    4.0 -0.3 D   49           8: 6  SEP 25 81 2  6 6
20 6  8.1225  232   41    5.1  0.8 D   79           8: 7  SEP 25 81 2  6 6
20 6  8.4156 1287 1055                 B  2         8:24  SEP 25 81 2  6 6
20 6  8.4267              4.3          A-1----      8:25  SEP 25 81 2  6 6
20 6  8.4431   59   59                 B  2         8:26  SEP 25 81 2  6 6
20 7  6.6636              4.3          A-1----      6:39  SEP 26 81 2  6 6
20 7  6.6850   77   77    4.0 -0.3 D   49           6:41  SEP 26 81 2  6 6
20 7  6.6964  118   41    4.8  0.5 D   79           6:41  SEP 26 81 2  6 6
20 7  6.9769 1128 1010                 B  2         6:58  SEP 26 81 2  6 6
20 7  7.5708              4.3          A-1----      7:34  SEP 26 81 2  6 6
20 7  7.5839   47   47    4.7  0.4 D   79          7:35  SEP 26 81 2  6 6
20 7  7.7022  473  426                 B  2         7:42  SEP 26 81 2  6 6
21 5  7.9344              4.3          A-1----      7:56  OCT  1 81 2  6 6
21 5  7.9492   53   53    4.2 -0.1 D   49          7:56  OCT  1 81 2  6 6
21 5  7.9564   79   26    3.8 -0.5 D   49          7:57  OCT  1 81 2  6 6
21 5  7.9653  111   32    4.5  0.2 D   79          7:57  OCT  1 81 2  6 6
21 5  8.1347  721  610                 B  2         8: 8  OCT  1 81 2  6 6
22 1  6.8428              4.3          A-1----      6:50  OCT  4 81 2  6 6
22 1  6.9444  366  366    3.6 -0.7 D   49          6:56  OCT  4 81 2  6 6
22 1  6.9556  406   40    4.9  0.6 D   79          6:57  OCT  4 81 2  6 6
22 1  7.3889 1966 1560                 B  2         7:23  OCT  4 81 2  6 6
22 1  7.6419              4.3          A-1----      7:38  OCT  4 81 2  6 6
22 1  7.6522   37   37    4.3  0.0 D   49          7:39  OCT  4 81 2  6 6
22 1  7.6686   96   59    4.7  0.4 D   79          7:40  OCT  4 81 2  6 6
22 1  7.7794  495  399                 B  2         7:46  OCT  4 81 2  6 6
22 4  7.1500              4.3          A-1----      7: 9  OCT  7 81 2  6 6
22 4  7.1731   83   83    4.1 -0.2 D   49          7:10  OCT  7 81 2  6 6
22 4  7.1817  114   31    4.7  0.4 D   79          7:10  OCT  7 81 2  6 6
22 4  7.4267  996  882                 B  2         7:25  OCT  7 81 2  6 6
22 4  7.5597              4.3          A-1----      7:33  OCT  7 81 2  6 6
22 4  7.6064  168  168    4.2 -0.1 D   49          7:36  OCT  7 81 2  6 6
22 4  7.6292  250   82    3.6 -0.7 D   49          7:37  OCT  7 81 2  6 6
22 4  7.6403  290   40    4.3  0.0 D   49          7:38  OCT  7 81 2  6 6
22 4  7.6506  327   37    4.2 -0.1 D   49          7:39  OCT  7 81 2  6 6
22 4  7.8242  952  625                 B  2         7:49  OCT  7 81 2  6 6
22 4  7.8286              4.3          A-1----      7:49  OCT  7 81 2  6 6
22 4  7.8306    7    7                 B  2         7:49  OCT  7 81 2  6 6
22 4  7.8344              4.3          A-1----      7:50  OCT  7 81 2  6 6
22 4  7.8406   22   22    4.4  0.1 D   79          7:50  OCT  7 81 2  6 6
22 4  8.0922  928  906                 B  2         8: 5  OCT  7 81 2  6 6
22 4  8.1678              4.3          A-1----      8:10  OCT  7 81 2  6 6
22 4  8.2050  134  134    4.5  0.2 D   79          8:12  OCT  7 81 2  6 6
22 4  8.9306 2746 2612                 B  2         8:55  OCT  7 81 2  6 6

R? T=0.02/0.22 12:20:55
```

Figure I-12. Complete Event Log for Check-in 9, Subject 06

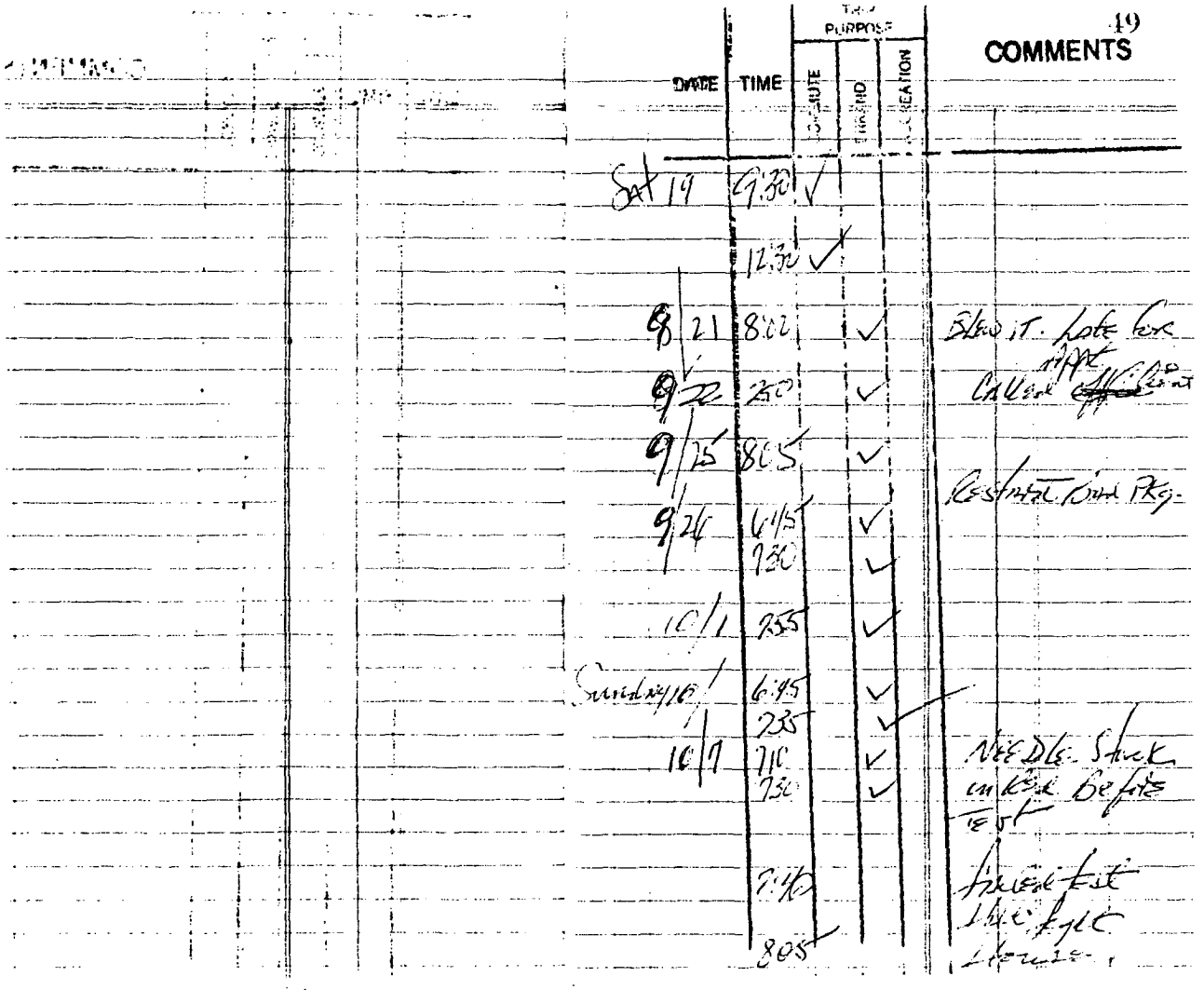


Figure I-13. Sample Page from Log Book of Subject 06

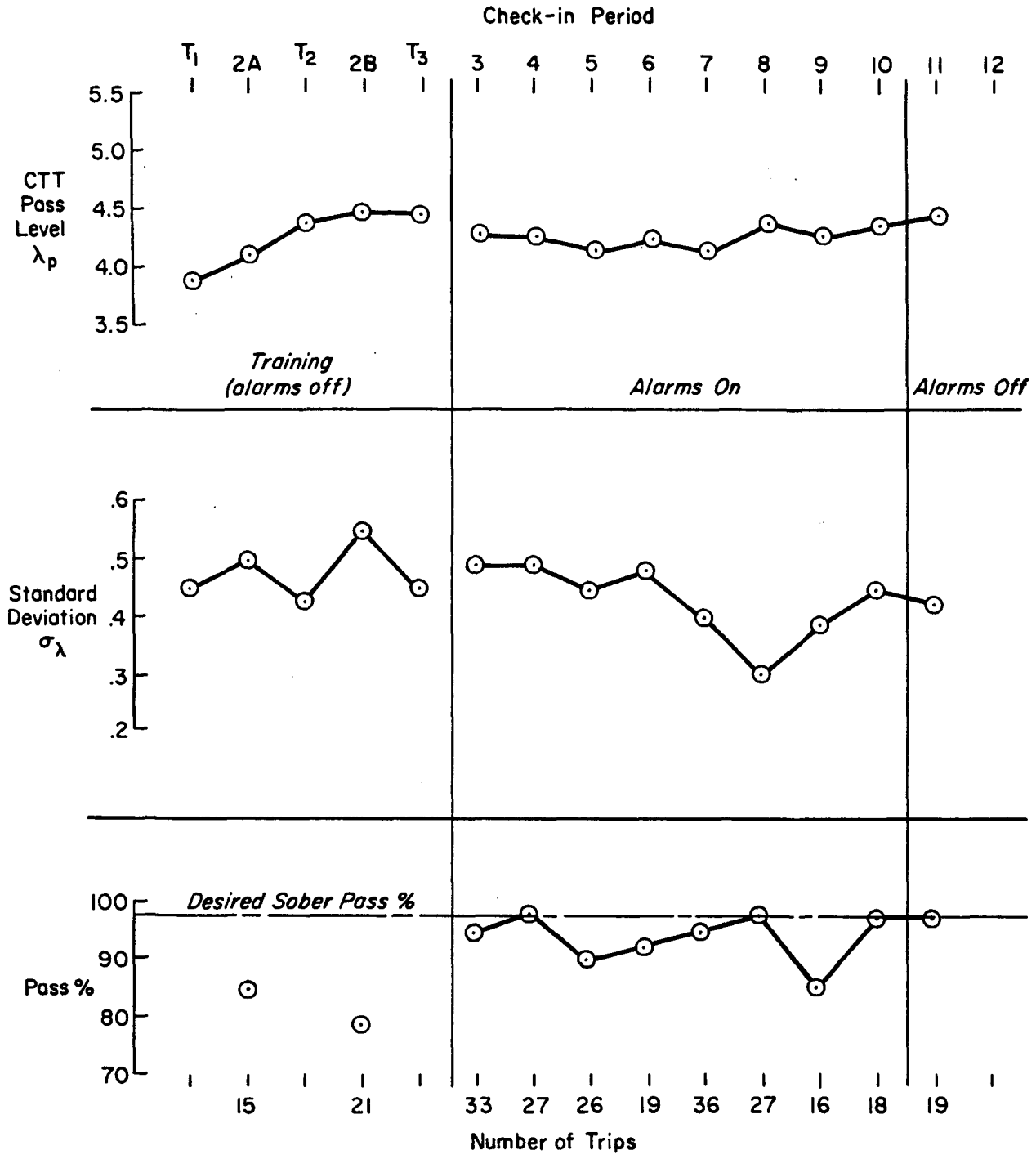
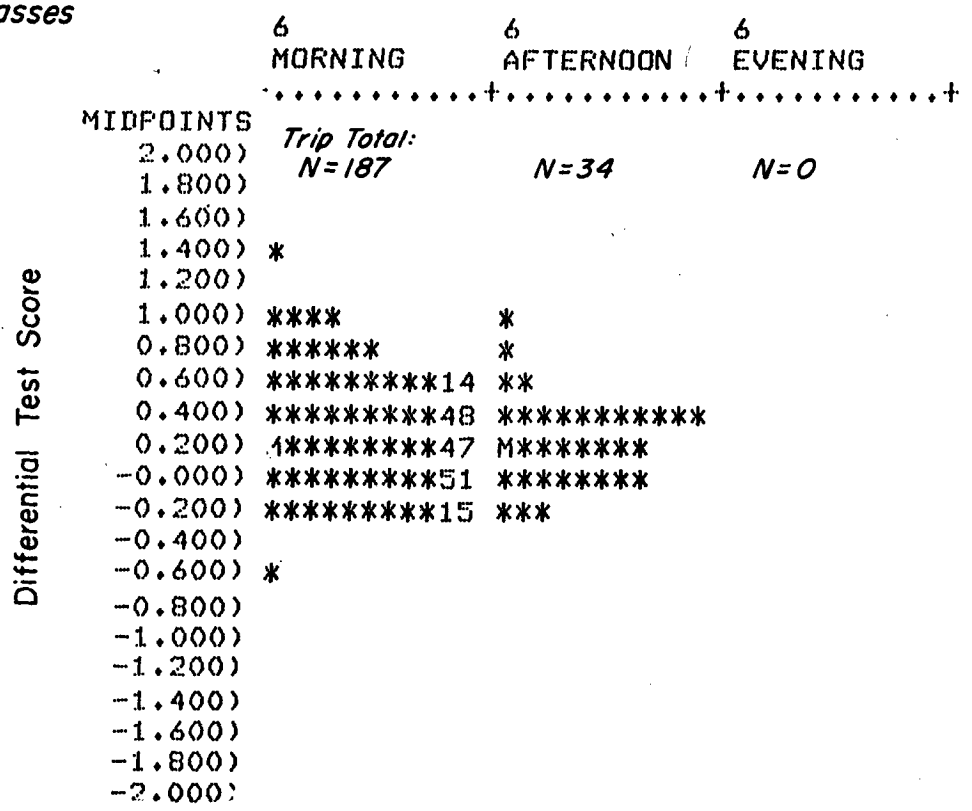


Figure I-14. Biweekly Performance Data for Subject 06

a) Passes



b) Failures

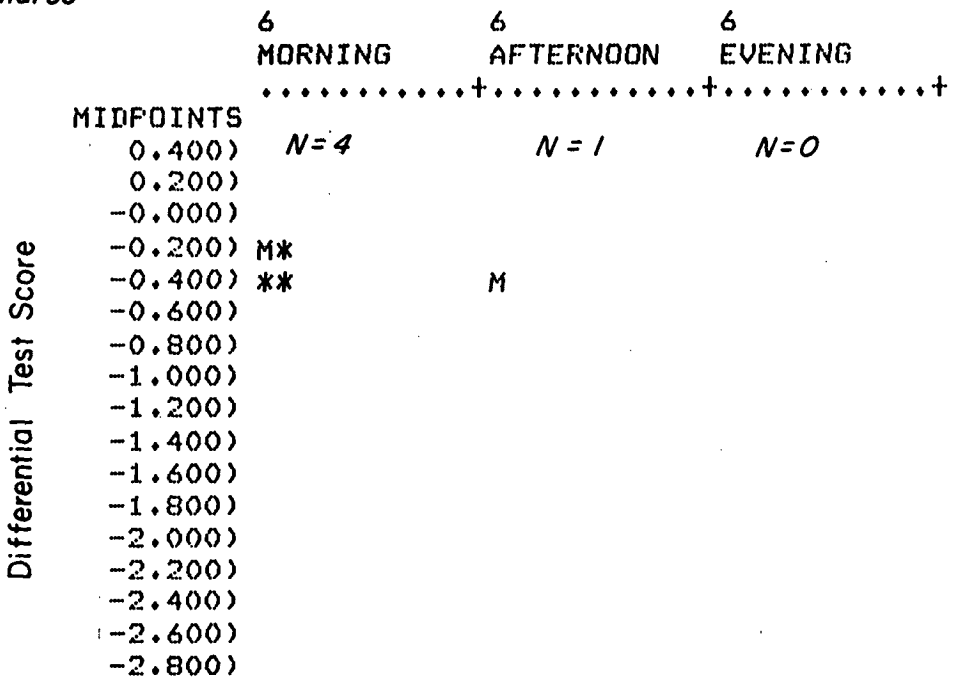


Figure I-15. Differential Test Score Histograms for Subject 06

Subject 07

Subject 07 owned her own business which secured bank loans for companies to install computer lines. Her own vehicle was a 1979 Model 924 Porsche and she was very embarassed to be driving a DDWS/Nova. She is, by her own admission, a very vain person. She had to entertain clients often, and while she was in the program, would have her clients come to her so no one would see the car. If anyone asked, she said it was a company car. She told only two people, her sister and a business associate, about her participation in the program. She did not tell her husband. She spent a lot of time traveling out of town and most likely drove rental cars but did not admit to this.

The training procedure was not clear to Subject 07 initially and she was under the impression she had to do the CTT training regime every time she had a check-in. She decided to stall and have her lawyer try to get her out of the program. We called the public health officer at the West Los Angeles Court who discussed potential alternatives with her such as jail time. She was most cooperative after this episode.

This subject maintained one of the highest CTT score levels. Figure I-18 shows a learning trend in the pass level and a drop in the standard deviation. This is indicative of her motivated performance. She said she made a game out of taking the test and only failed when her kids were in the car. Because of her high pass level, and the fact that she had a very low alcohol tolerance, three glasses of wine with lunch kept her from driving for 4 hours (see Figs. I-16, I-17. She changed her driving patterns by using more drive-through services and she cut out shopping trips as recreation. She said she drove a lot less overall and saved money in the long run because of less shopping. At the end of the six month period she commented that she actually liked the Nova because, unlike her Porsche, it had air conditioning and an automatic transmission.

Subject 07 drove 5,225 miles in 6 months and had four test failures. The miles driven falls in the average range as does the rate of deterred trips. Her total number of trips however is low. This is probably due

to longer than average trips and loss of most of the trip data during the second biweekly period due to a data logger malfunction. This is also when she was stalling and accounts for over a month of driving. Her deterred drive rate should have been much lower. Histograms in Fig. I-19 show no evening driving, and test failures in the afternoon only.

```
 9  4 13.7850                4.7          A-1----                1:47P AUG 26 81 2  7 9
 9  4 13.7953   37   37      5.1  0.4 D   7                      1:47P AUG 26 81 2  7 9
 9  4 14.2136 1543 1506                   B  2                   2:12P AUG 26 81 2  7 9
 9  4 14.6794                4.7          A-1----                2:40P AUG 26 81 2  7 9
 9  4 14.7014   79   79      5.4  0.7 D   79                     2:42P AUG 26 81 2  7 9
 9  4 14.8547  631  552                   B  2                   2:51P AUG 26 81 2  7 9
 9  5 10.0764                4.7          A-1----               10: 4  AUG 27 81 2  7 9
 9  5 10.0847   30   30      4.7  0.0 D   4                     10: 5  AUG 27 81 2  7 9
 9  5 10.0956   69   39      5.5  0.8 D   7                     10: 5  AUG 27 81 2  7 9
 9  5 10.6417 2035 1966                   B  2                  10:38  AUG 27 81 2  7 9
 9  5 13.5244                4.7          A-1----                1:31P AUG 27 81 2  7 9
 9  5 13.5364   43   43      5.0  0.3 D   79                     1:32P AUG 27 81 2  7 9
 9  5 14.0922 2044 2001                   B  2                   2: 5P AUG 27 81 2  7 9
 9  5 15.4478                4.7          A-1----                3:26P AUG 27 81 2  7 9
 9  5 15.4586   39   39      5.1  0.4 D   79                     3:27P AUG 27 81 2  7 9
 9  5 15.5567  392  353                   B  2                   3:33P AUG 27 81 2  7 9
 9  6  9.4978                4.7          A-1----                9:29  AUG 28 81 2  7 9
 9  6  9.5089   40   40      4.8  0.1 D   79                     9:30  AUG 28 81 2  7 9
 9  6  9.6531  559  519      5.2  0.5 D   7                      9:39  AUG 28 81 2  7 9
 9  6  9.9194 1518  959                   B  2                   9:55  AUG 28 81 2  7 9
 9  6 10.1144                4.7          A-1----               10: 6  AUG 28 81 2  7 9
 9  6 10.1483  122  122                   B  2                  10: 8  AUG 28 81 2  7 9
 9  6 10.3833                4.7          A-1----               10:23  AUG 28 81 2  7 9
 9  6 10.5131  467  467                   B  2                  10:30  AUG 28 81 2  7 9
 9  6 10.8392                4.7          A-1----              10:50  AUG 28 81 2  7 9
 9  6 10.8494   37   37      4.9  0.2 D   79                    10:50  AUG 28 81 2  7 9
 9  6 11.0289  683  646                   B  2                  11: 1  AUG 28 81 2  7 9
 9  6 14.7203                4.7          A-1----               2:43P AUG 28 81 2  7 9
 9  6 14.7331   46   46      5.3  0.6 D   79                    2:43P AUG 28 81 2  7 9
 9  6 14.9022  655  609                   B  2                   2:54P AUG 28 81 2  7 9
 9  6 16.7783                4.7          A-1----               4:46P AUG 28 81 2  7 9
 9  6 16.7875   33   33      2.8 -1.9 D   4                     4:47P AUG 28 81 2  7 9
 9  6 16.9647  671  638                   B  2                   4:57P AUG 28 81 2  7 9
 9  6 20.1403                4.7          A-1----               8: 8P AUG 28 81 2  7 9
 9  6 20.1461   21   21      3.9 -0.8 D   4                     8: 8P AUG 28 81 2  7 9
 9  6 20.1600   71   50      3.6 -1.1 D   49                    8: 9P AUG 28 81 2  7 9
 9  6 20.1647   88   17      1.6 -3.1 D   4                     8: 9P AUG 28 81 2  7 9
 9  6 20.1753  126   38      4.2 -0.5 D   4                     8:10P AUG 28 81 2  7 9
 9  6 20.3555  775  649      4.5 -0.2 D   49                    8:21P AUG 28 81 2  7 9
 9  6 20.3644  807   32      4.5 -0.2 D   4                     8:21P AUG 28 81 2  7 9
 9  6 20.3722  835   28      4.6 -0.1 D   4                     8:22P AUG 28 81 2  7 9
 9  6 20.3786  858   23      3.5 -1.2 D   4                     8:22P AUG 28 81 2  7 9
 9  6 20.5525 1484  626                   B  2                   8:33P AUG 28 81 2  7 9
 9  6 20.5542                4.7          A-1----               8:33P AUG 28 81 2  7 9
 9  6 20.5594   19   19      3.9 -0.8 D   49                    8:33P AUG 28 81 2  7 9
 9  6 20.5683   51   32      3.7 -1.0 D   49                    8:34P AUG 28 81 2  7 9
 9  6 20.5775   84   33      3.9 -0.8 D   49                    8:34P AUG 28 81 2  7 9
 9  6 20.5878  121   37      4.6 -0.1 D   49                    8:35P AUG 28 81 2  7 9
 9  6 20.7614  746  625                   B  2                   8:45P AUG 28 81 2  7 9
 9  6 20.7664                4.7          A-1----               8:45P AUG 28 81 2  7 9
 9  6 20.7803   50   50      4.6 -0.1 D   49                    8:46P AUG 28 81 2  7 9
 9  6 20.7905   87   37      4.4 -0.3 D   4                     8:47P AUG 28 81 2  7 9
 9  6 20.8011  125   38      4.1 -0.6 D   4                     8:48P AUG 28 81 2  7 9
 9  6 20.8100  157   32      4.8  0.1 D   7                     8:48P AUG 28 81 2  7 9
 9  6 21.3525 2110 1953                   B  2                   9:21P AUG 28 81 2  7 9
10  1 12.8328                4.7          A-1----              12:49P AUG 30 81 2  7 9
10  1 12.8428   36   36      5.4  0.7 D   79                   12:50P AUG 30 81 2  7 9
10  1 12.9839  544  508                   B  2                  12:59P AUG 30 81 2  7 9
10  2 10.0683                4.7          A-1----              10: 4  AUG 31 81 2  7 9
10  2 10.0853   61   61      5.9  1.2 D   7                    10: 5  AUG 31 81 2  7 9
10  2 10.6031 1925 1864                   B  2                  10:36  AUG 31 81 2  7 9
10  2 16.1483                4.7          A-1----               4: 8P AUG 31 81 2  7 9
10  2 16.1597   41   41      5.5  0.8 D   7                     4: 9P AUG 31 81 2  7 9
10  2 16.7572 2192 2151                   B  2                   4:45P AUG 31 81 2  7 9
10  3 10.4247                4.7          A-1----              10:25  SEP  1 81 2  7 9
10  3 10.4364   42   42      5.5  0.8 D   7                    10:26  SEP  1 81 2  7 9
10  3 11.0394 2213 2171                   B  2                  11: 2  SEP  1 81 2  7 9
10  3 16.2569                4.7          A-1----               4:15P SEP  1 81 2  7 9
10  3 16.2730   58   58      5.7  1.0 D   79                    4:16P SEP  1 81 2  7 9
10  3 16.8697 2206 2148                   B  2                   4:52P SEP  1 81 2  7 9
10  3 17.3275                4.7          A-1----               5:19P SEP  1 81 2  7 9
10  3 17.3358   30   30      5.4  0.7 D   79                    5:20P SEP  1 81 2  7 9
10  3 17.4442  420  390                   B  2                   5:26P SEP  1 81 2  7 9
10  3 17.7583                4.7          A-1----               5:45P SEP  1 81 2  7 9
10  3 17.7761   64   64      5.2  0.5 D   79                    5:46P SEP  1 81 2  7 9
10  3 17.8669  391  327                   B  2                   5:52P SEP  1 81 2  7 9
10  6 10.9428                4.7          A-1----              10:56  SEP  4 81 2  7 9
10  6 10.9539   40   40      5.4  0.7 D   7                    10:57  SEP  4 81 2  7 9
10  6 11.4442 1805 1765                   B  2                  11:26  SEP  4 81 2  7 9
10  6 13.6219                4.7          A-1----               1:37P SEP  4 81 2  7 9
10  6 13.6322   37   37      4.9  0.2 D   79                    1:37P SEP  4 81 2  7 9
10  6 14.4892 3122 3085                   B  2                   2:29P SEP  4 81 2  7 9
11  3 10.4278                4.7          A-1----              10:25  SEP  8 81 2  7 9
11  3 10.4381   37   37      6.0  1.3 D   79                   10:26  SEP  8 81 2  7 9
11  3 10.9369 1833 1796                   B  2                  10:56  SEP  8 81 2  7 9
11  3 14.4697                4.7          A-1----               2:28P SEP  8 81 2  7 9
```

Figure I-16. Excerpt from Event Log for Subject 07, Check-in No. 5

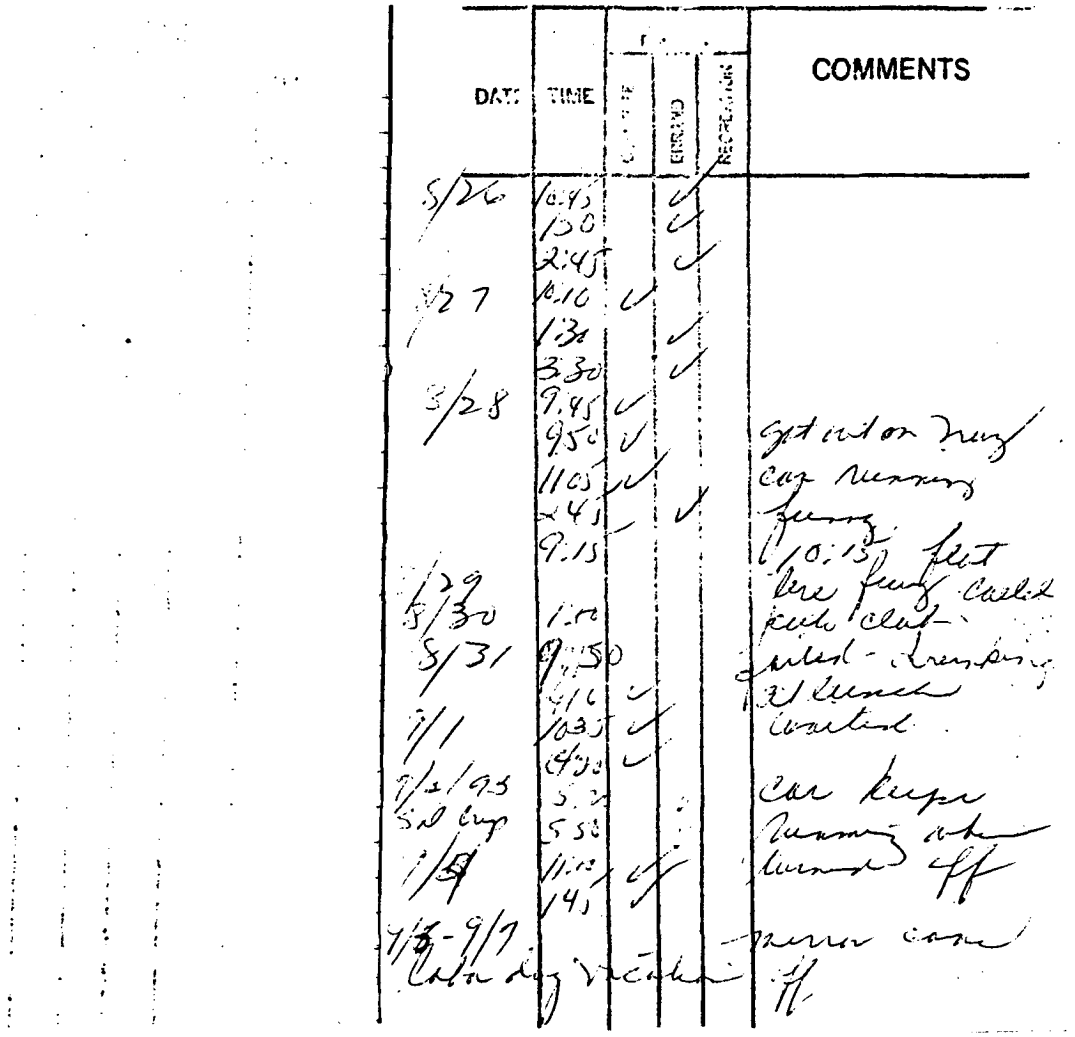


Figure I-17. Sample Page from Log Book of Subject 07

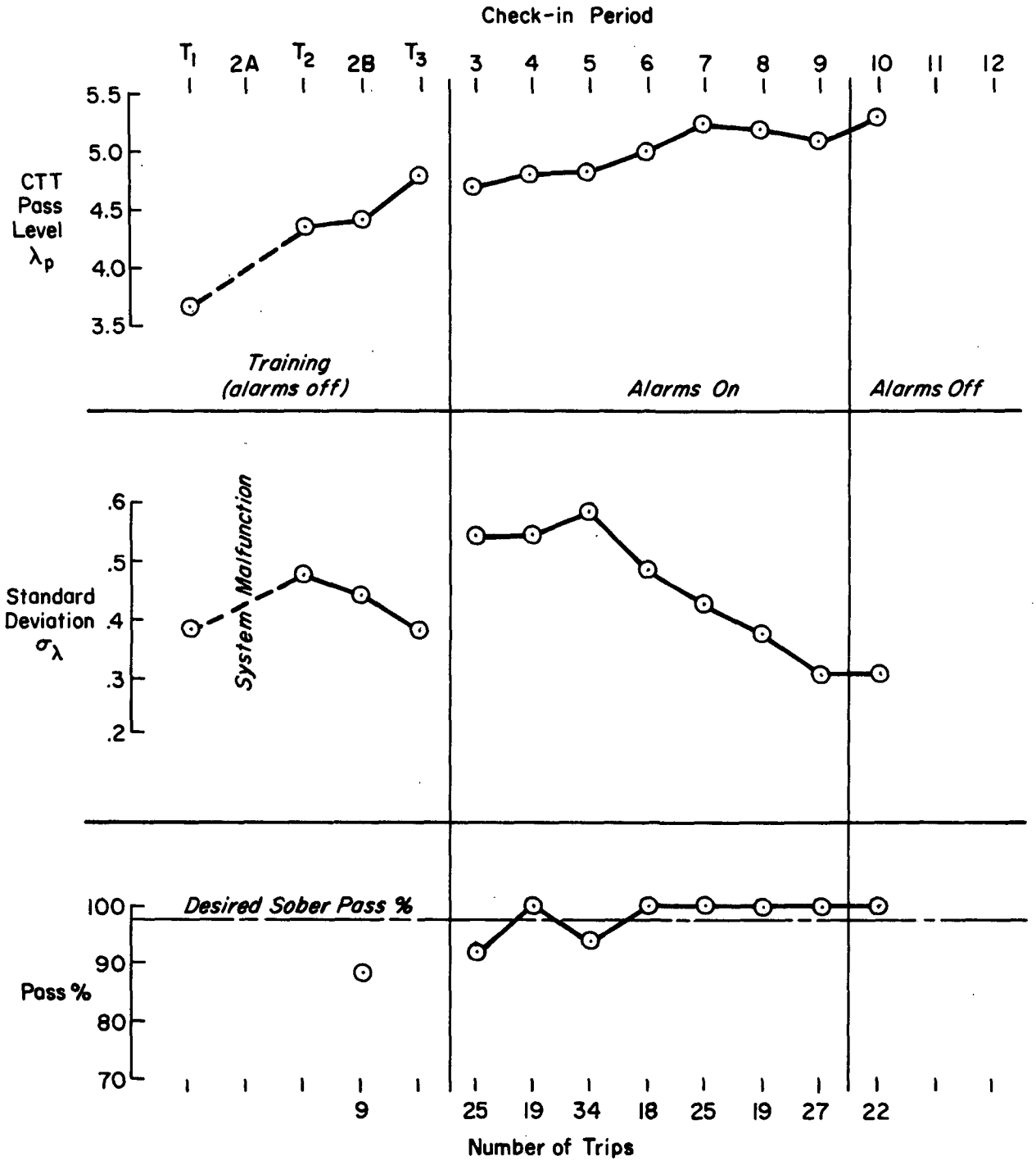
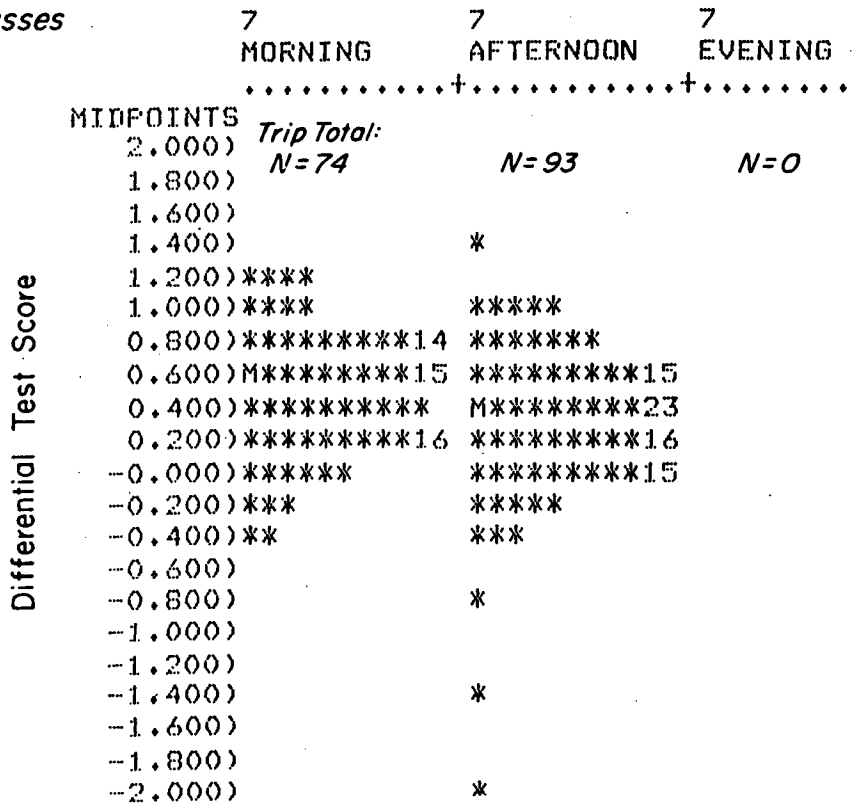


Figure I-18. Biweekly Performance Data for Subject 07

a) Passes



b) Failures

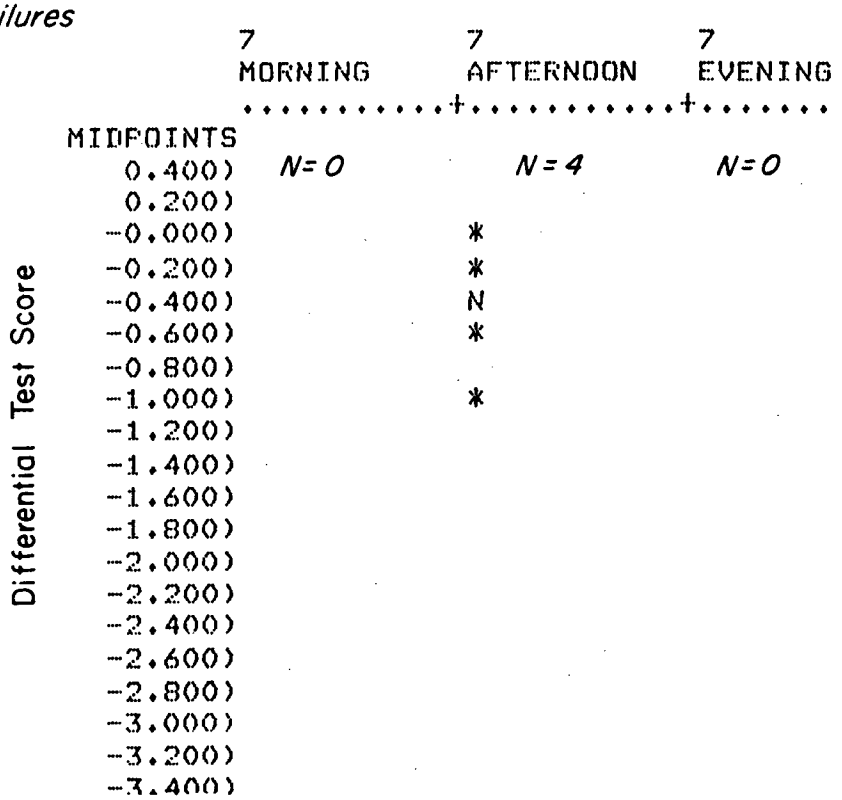


Figure I-19. Differential Test Score Histograms for Subject 07

Subject 08

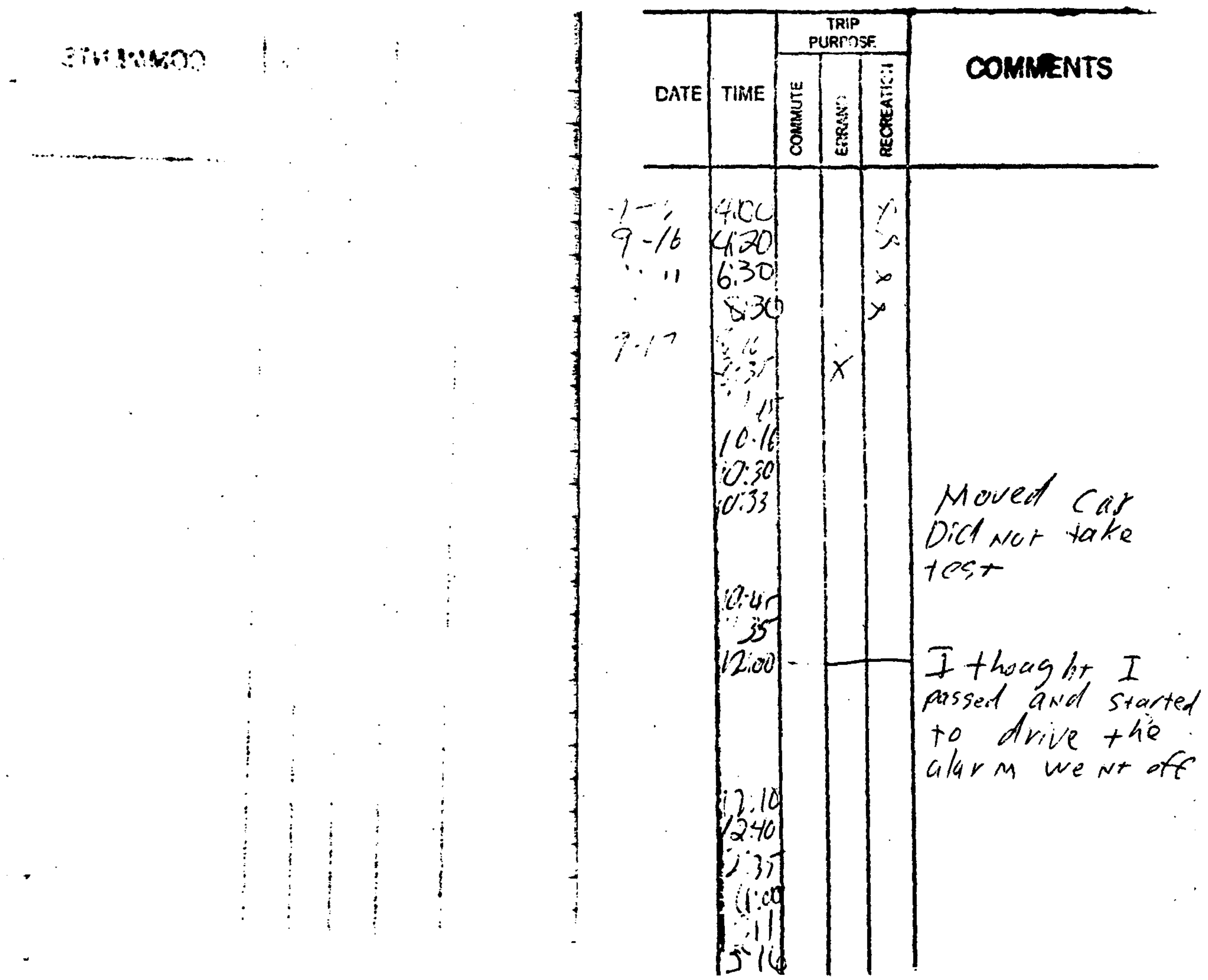
Subject 08 was 23 years old and worked in the construction business. He liked to listen to the radio during his lunch hour. After passing the test, the system allows 3 minutes to start the engine, otherwise it asks for another test. He would sit in the DDWS/Nova, listening to the radio, and taking the test every three minutes so that the hazard lights wouldn't flash. Figure I-22 shows a strong learning trend because of all this extra practice.

Subject 08 took a three week trip to Louisiana without apparent incident aside from 2 speeding tickets. Because of his habit of listening to the radio, he installed a Blaupunkt stereo in the Nova. When he installed the stereo he took up the driver side threshold plate. This is technically a violation of probation as the wires from the display to the computer module in the trunk are run under the plate. Upon finding the wires he ran the radio wires under the passenger side threshold plate. He informed us immediately about the incident. His own vehicle was a 57 Ford 1/2 ton pick-up which he had completely restored. He did a lot of mechanical work on the Nova including installing a new alternator.

It took almost a month from conviction to car assignment for Subject 08 because he kept taking the wrong papers to the various offices. He drove 11,351 miles and had four deterred drives. Subject 8 drove more miles than any other subject, however, 5 subjects had more trips. This is probably due to his cross-country vacation. His deterred driving frequency was slightly below average. Figures I-21 and I-22 show an example of a problem failure which occurred when he thought he had passed. Figure I-21 also shows a case where he arrived at work and listened to the radio for 30 minutes. When he completed the project he was interviewed for a radio report on DDWS and he credited the DDWS/Nova with changing his drinking behavior. He said initially he drank less because of the car, then he noticed he was still enjoying himself as much if not more than before. Histograms in Fig. I-23 show primarily morning and afternoon trips with minimal failures.

12	5	8.1431			4.7			A-1----			8: 8	SEP	17	81	2	8	8
12	5	8.1614	66	66	5.5	0.8	D	7			8: 9	SEP	17	81	2	8	8
12	5	8.3581	774	708			B	2			8:21	SEP	17	81	2	8	8
12	5	8.5483			4.7			A-1----			8:32	SEP	17	81	2	8	8
12	5	8.5606	44	44	4.9	0.2	D	7			8:33	SEP	17	81	2	8	8
12	5	8.7272	644	600			B	2			8:43	SEP	17	81	2	8	8
12	5	10.3094			4.7			A-1----			10:18	SEP	17	81	2	8	8
12	5	10.3178	30	30	4.8	0.1	D	79	? at Frank mailed letter		10:19	SEP	17	81	2	8	8
12	5	10.3494	144	114	4.3	-0.4	D	4			10:20	SEP	17	81	2	8	8
12	5	10.3611	186	42	5.6	0.9	D	7			10:21	SEP	17	81	2	8	8
12	5	10.4336	447	261			B	2			10:26	SEP	17	81	2	8	8
12	5	10.4511			4.7			A-1----			10:27	SEP	17	81	2	8	8
12	5	10.4597	31	31	5.2	0.5	D	7			10:27	SEP	17	81	2	8	8
12	5	10.5472	346	315			B	2			10:32	SEP	17	81	2	8	8
12	5	10.7697			4.7			A-1----			10:46	SEP	17	81	2	8	8
12	5	10.7764	24	24	4.6	-0.1	D	4			10:46	SEP	17	81	2	8	8
12	5	10.7831	48	24	4.0	-0.7	D	49			10:46	SEP	17	81	2	8	8
12	5	10.7944	89	41	4.8	0.1	D	79			10:47	SEP	17	81	2	8	8
12	5	11.4942	2608	2519			B	2			11:29	SEP	17	81	2	8	8
12	5	11.6181			4.7			A-1----			11:37	SEP	17	81	2	8	8
12	5	11.6289	39	39	4.9	0.2	D	79			11:37	SEP	17	81	2	8	8
12	5	11.7069	320	281			B	2			11:42	SEP	17	81	2	8	8
12	5	12.0094			4.7			A-1----	thought he had passed turn signal was on & confused him		12: 0P	SEP	17	81	2	8	8
12	5	12.0233	50	50	4.6	-0.1	D	4			12: 1P	SEP	17	81	2	8	8
12	5	12.0444	126	76			E	5			12: 2P	SEP	17	81	2	8	8
12	5	12.2208	761	635			B	2			12:13P	SEP	17	81	2	8	8
12	5	12.2261			4.7			A-1----			12:13P	SEP	17	81	2	8	8
12	5	12.2356	34	34	4.9	0.2	D	7			12:14P	SEP	17	81	2	8	8
12	5	12.6278	1446	1412			B	2			12:37P	SEP	17	81	2	8	8
12	5	12.6919			4.7			A-1----			12:41P	SEP	17	81	2	8	8
12	5	12.7014	34	34	4.6	-0.1	D	4			12:42P	SEP	17	81	2	8	8
12	5	12.7086	60	26	4.1	-0.6	D	49			12:42P	SEP	17	81	2	8	8
12	5	12.7181	94	34	5.0	0.3	D	79			12:43P	SEP	17	81	2	8	8
12	5	13.3569	2394	2300			B	2			1:21P	SEP	17	81	2	8	8
12	5	14.6000			4.7			A-1----			2:36P	SEP	17	81	2	8	8
12	5	14.6083	30	30	4.5	-0.2	D	49			2:36P	SEP	17	81	2	8	8
12	5	14.6233	84	54	5.4	0.7	D	79			2:37P	SEP	17	81	2	8	8
12	5	15.8233	4404	4320			B	2			3:49P	SEP	17	81	2	8	8
12	5	15.8500			4.7			A-1----			3:51P	SEP	17	81	2	8	8
12	5	15.8597	35	35	4.4	-0.3	D	49			3:51P	SEP	17	81	2	8	8
12	5	15.8717	78	43	5.8	1.1	D	79			3:52P	SEP	17	81	2	8	8
12	5	16.1083	930	852			B	2			4: 6P	SEP	17	81	2	8	8
12	5	17.1205			4.7			A-1----			5: 7P	SEP	17	81	2	8	8
12	5	17.1830	225	225	5.4	0.7	D	79			5:10P	SEP	17	81	2	8	8
12	5	17.2514	471	246	5.7	1.0	D	7			5:15P	SEP	17	81	2	8	8
12	5	17.6358	1855	1384			B	2			5:38P	SEP	17	81	2	8	8
12	5	17.6889			4.7			A-1----			5:41P	SEP	17	81	2	8	8
12	5	17.7003	41	41	4.8	0.1	D	79			5:42P	SEP	17	81	2	8	8
12	5	17.8678	644	603			B	2			5:52P	SEP	17	81	2	8	8
12	5	17.9303			4.7			A-1----			5:55P	SEP	17	81	2	8	8
12	5	17.9372	25	25	4.7	0.0	D	4			5:56P	SEP	17	81	2	8	8
12	5	17.9556	91	66	5.3	0.6	D	7			5:57P	SEP	17	81	2	8	8
12	5	18.0594	465	374			B	2			6: 3P	SEP	17	81	2	8	8
12	6	6.1372			4.7			A-1----			6: 8	SEP	18	81	2	8	8
12	6	6.1469	35	35	4.8	0.1	D	7			6: 8	SEP	18	81	2	8	8
12	6	6.4414	1095	1060			B	2			6:26	SEP	18	81	2	8	8
12	6	6.4419			4.7			A-1----	listening to radio at work		6:26	SEP	18	81	2	8	8
12	6	6.4486	24	24	4.0	-0.7	D	49			6:26	SEP	18	81	2	8	8
12	6	6.4569	54	30	5.1	0.4	D	79			6:27	SEP	18	81	2	8	8
12	6	6.7208	1004	950	4.2	-0.5	D	4			6:43	SEP	18	81	2	8	8
12	6	6.7328	1047	43	4.8	0.1	D	7			6:43	SEP	18	81	2	8	8
12	6	6.9253	1740	693			B	2			6:55	SEP	18	81	2	8	8
12	6	7.0114			4.7			A-1----			7: 0	SEP	18	81	2	8	8
12	6	7.0197	30	30	4.3	-0.4	D	4			7: 1	SEP	18	81	2	8	8
12	6	7.0328	77	47	5.3	0.6	D	7			7: 1	SEP	18	81	2	8	8
12	6	7.7708	2734	2657			B	2			7:46	SEP	18	81	2	8	8
12	6	7.9833			4.7			A-1----			7:59	SEP	18	81	2	8	8
12	6	7.9903	25	25	4.9	0.2	D	7			7:59	SEP	18	81	2	8	8
12	6	8.0858	369	344			B	2			8: 5	SEP	18	81	2	8	8
12	6	17.0956			4.7			A-1----			5: 5P	SEP	18	81	2	8	8
12	6	17.1111	56	56	5.1	0.4	D	7			5: 6P	SEP	18	81	2	8	8
12	6	17.2150	430	374			B	2			5:12P	SEP	18	81	2	8	8
12	6	17.5553			4.7			A-1----			5:33P	SEP	18	81	2	8	8
12	6	17.5669	42	42	4.8	0.1	D	79			5:34P	SEP	18	81	2	8	8
12	6	17.8392	1022	980			B	2			5:50P	SEP	18	81	2	8	8
12	7	17.5108			4.7			A-1----			5:30P	SEP	19	81	2	8	8
12	7	17.5194	31	31	5.4	0.7	D	7			5:31P	SEP	19	81	2	8	8
12	7	17.7556	881	850			B	2			5:45P	SEP	19	81	2	8	8
12	7	17.8083			4.7			A-1----			5:48P	SEP	19	81	2	8	8
12	7	17.8194	40	40	4.9	0.2	D	79			5:49P	SEP	19	81	2	8	8
12	7	17.9442	489	449			B	2			5:56P	SEP	19	81	2	8	8
12	7	18.5847			4.7			A-1----			6:35P	SEP	19	81	2	8	8
12	7	18.6003	56	56	4.4	-0.3	D	49			6:36P	SEP	19	81	2	8	8
12	7	18.6111	95	39	4.7	0.0	D	49			6:36P	SEP	19	81	2	8	8
12	7	18.6225	136	41	4.8	0.1	D	79			6:37P	SEP	19	81	2	8	8
12	7	..6003	776	640			B	2			6:48P	SEP	19	81	2	8	8

Figure I-20. Excerpt of Event Log for Subject 08, Check-in 8



DATE	TIME	TRIP PURPOSE: COMMUTE	TRIP PURPOSE: ERRAND	TRIP PURPOSE: RECREATION	COMMENTS
[illegible]	4:00			X	
9-16	4:20			X	
"	6:30			X	
	8:30			X	
9-17	[illegible]				
	[illegible]		X		
	[illegible]				
	10:16				
	10:30				
	10:33				Moved Car Did Not take test
	10:40				
	35				
	12:00				I thought I passed and started to drive the alarm went off
	12:10				
	12:40				
	[illegible]				
	1:00				
	11				
	[illegible]				

Figure I-21. Sample Page from Log Book of Subject 08

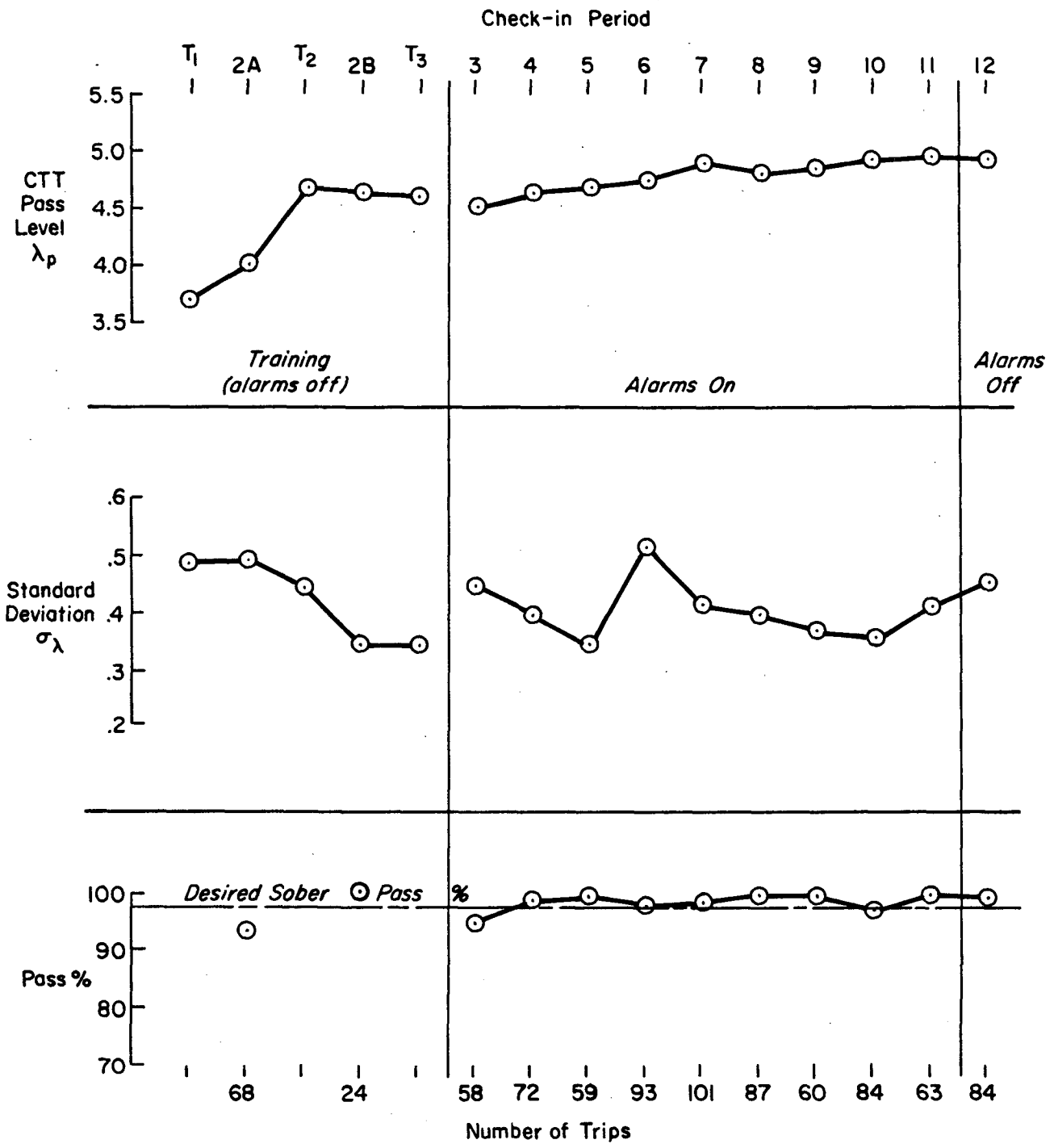
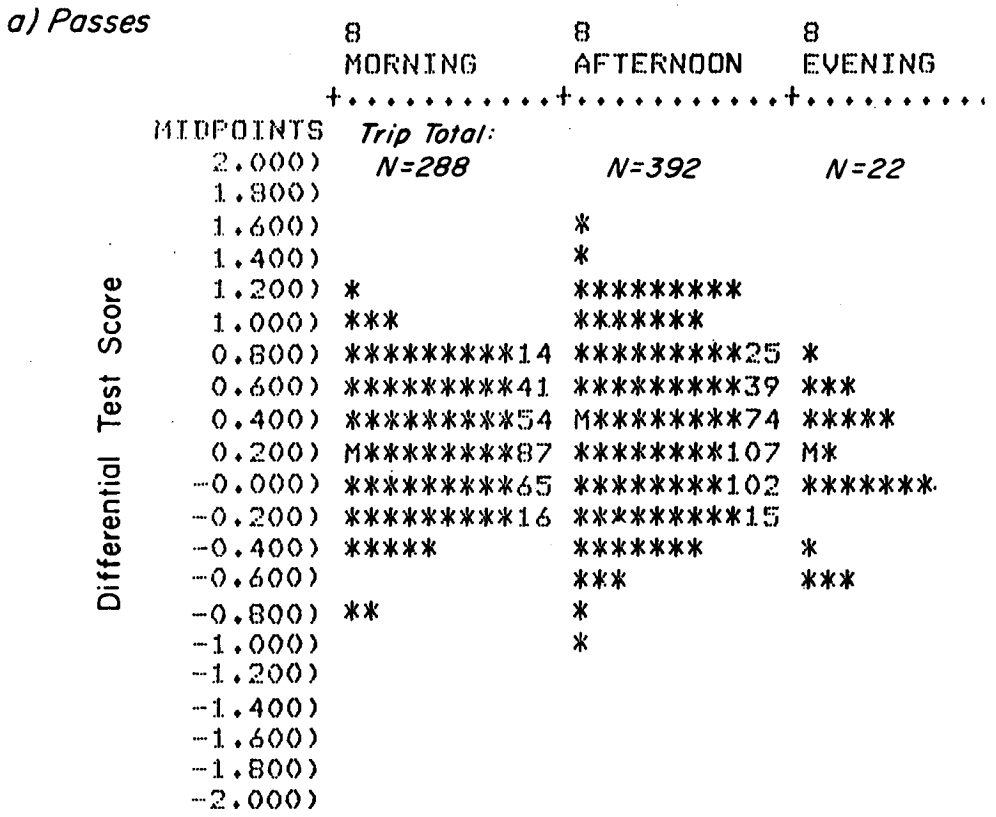


Figure I-22. Biweekly Performance Data for Subject 08

a) Passes



b) Failures

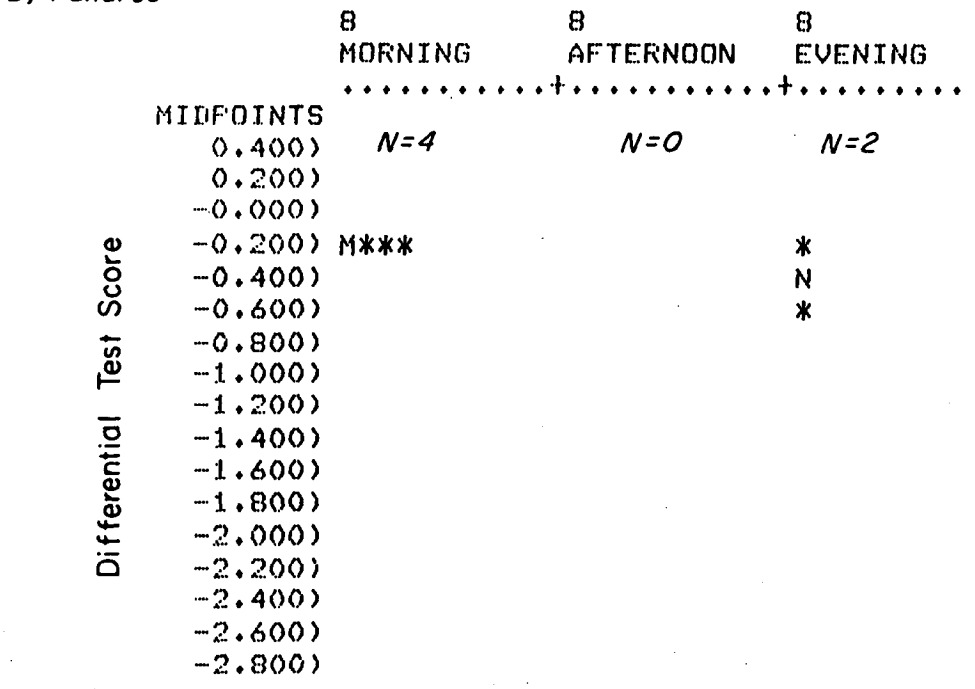


Figure I-23. Differential Test Score Histograms for Subject 08

Subject 09

Subject 09 was 46 years old and worked in the payroll department of a large corporation. His own car was a 1976 Chevrolet Caprice. He was extremely nervous, which was evidenced by MMPI scores and the amount he smoked. He never showed the car to anyone, and told only one friend about it. His routine driving pattern consisted of many short trips. He maintained a very high pass level and drank very little during the experimental period. His check-in appointment was every other Monday at 1:00 p.m. He would drive in, park, open the trunk and go across the street to the coffee shop for lunch. By the time he came back from lunch, the data tape had been processed and the event report was printed. There were hardly ever any failures to discuss and never any deterred drives. He played bridge on Saturday nights and sometimes would fail because of the late hour (2:00 a.m.).

Subject 09 was very quiet and never volunteered any information. He was most co-operative and answered all questions completely and promptly. All and all, very few words were exchanged with this man. However, about two weeks after he turned in the car, he called STI to say that he thought the program was wonderful and that if we ever needed someone to talk to new subjects, the media, etc., he would be more than happy to do it.

Subject 09 never tried to take the test after drinking, and had no deterred drives. Figure I-24 shows fairly stable performance, peaking out at mid-term (check-in 7, 8). The increasing standard deviation score for check-in 12 with corresponding failure rate, may have been reduced motivation. He drove 6,278 miles which is in the average range, while his total number of trips (1,151) is in the high range. The histograms in Fig. I-25 show heavy driving frequency and minimal failures.

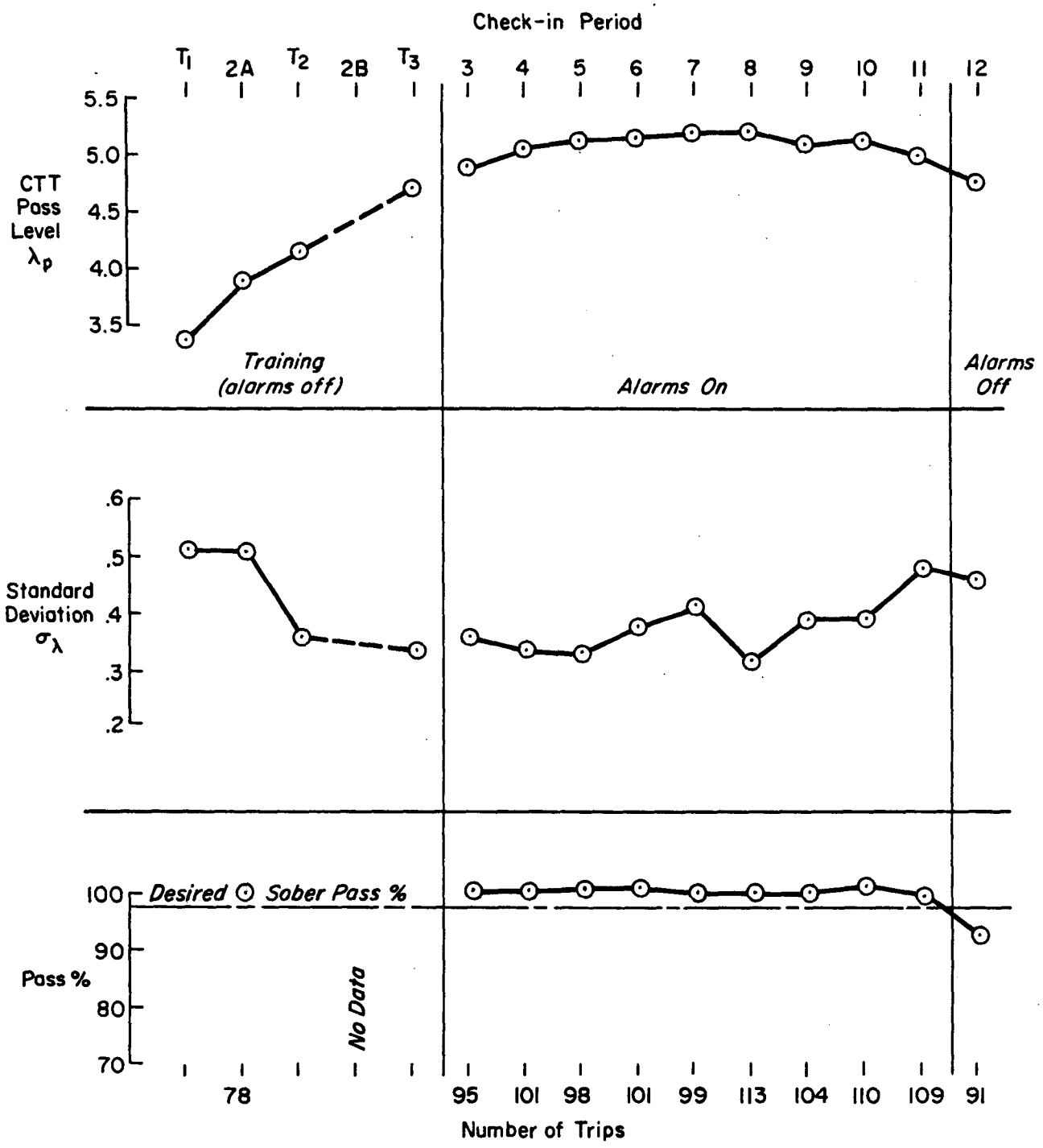
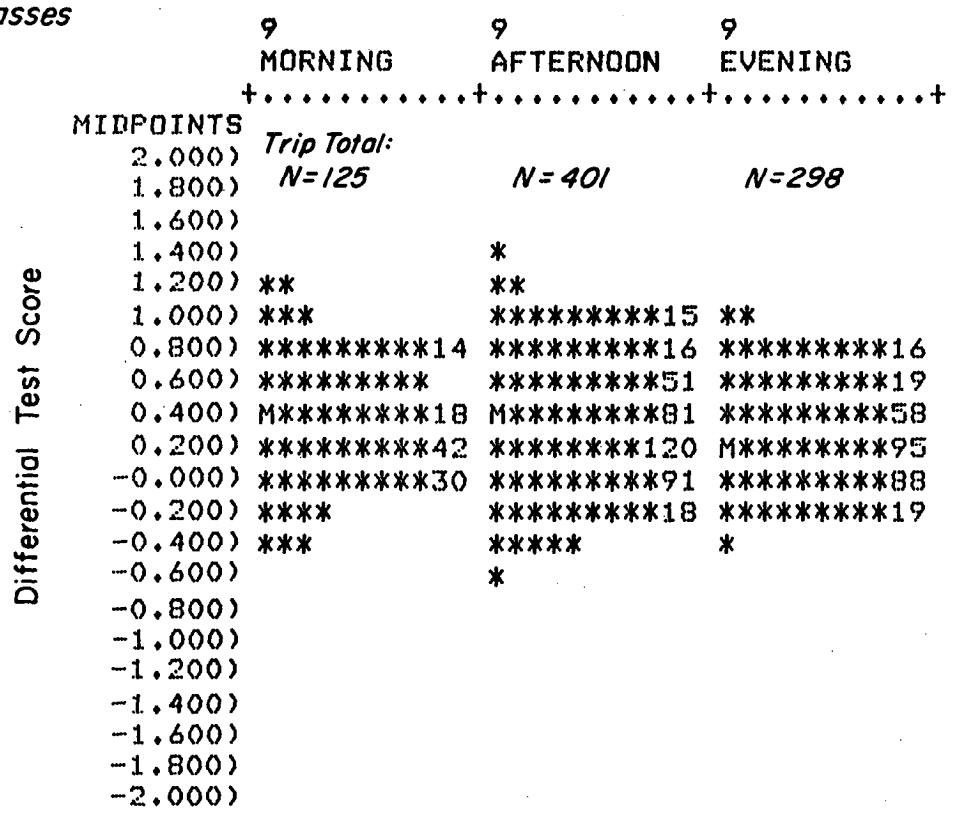


Figure I-24. Biweekly Performance Data for Subject 09

a) Passes



b) Failures

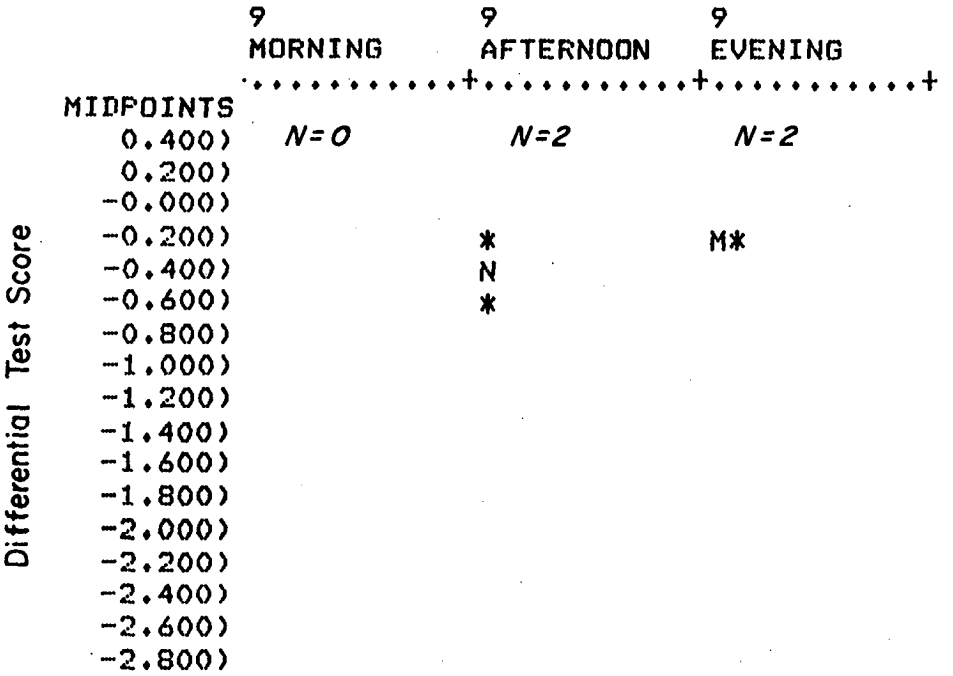


Figure I-25. Differential Test Score Histograms for Subject 09

Subject 10

Subject 10 was 30 years old and managed a retail store when he entered the DDWS program. Shortly thereafter he became unemployed. His own car was a 1976 Toyota Corolla. He would go for days without driving the DDWS car and it was felt that he was probably driving his Toyota for economic reasons. He then got a night job as a security guard and tried to use the DDWS car to make rounds. He failed the test so often because of "the late hour" that he had to make the rounds on foot (or so he said). These failures show up in the "morning" period in Fig. I-27 which extends from 4:00 a.m. to 12 noon. During his last week on the program the DDWS car sustained $1,500 damages as the result of a hit and run driver. The same accident totaled his Toyota. He drove 2,058 miles and had nine deterred drives.

Subject 10's total number of trips was low, as was the total miles driven. His deterred drive rate was in the average range. Figure I-26 shows a slight learning trend. It also shows an erratic failure rate, most likely due to the small number of trips. The histograms in Fig. I-27 show minimal evening driving and failures in the morning and afternoon.

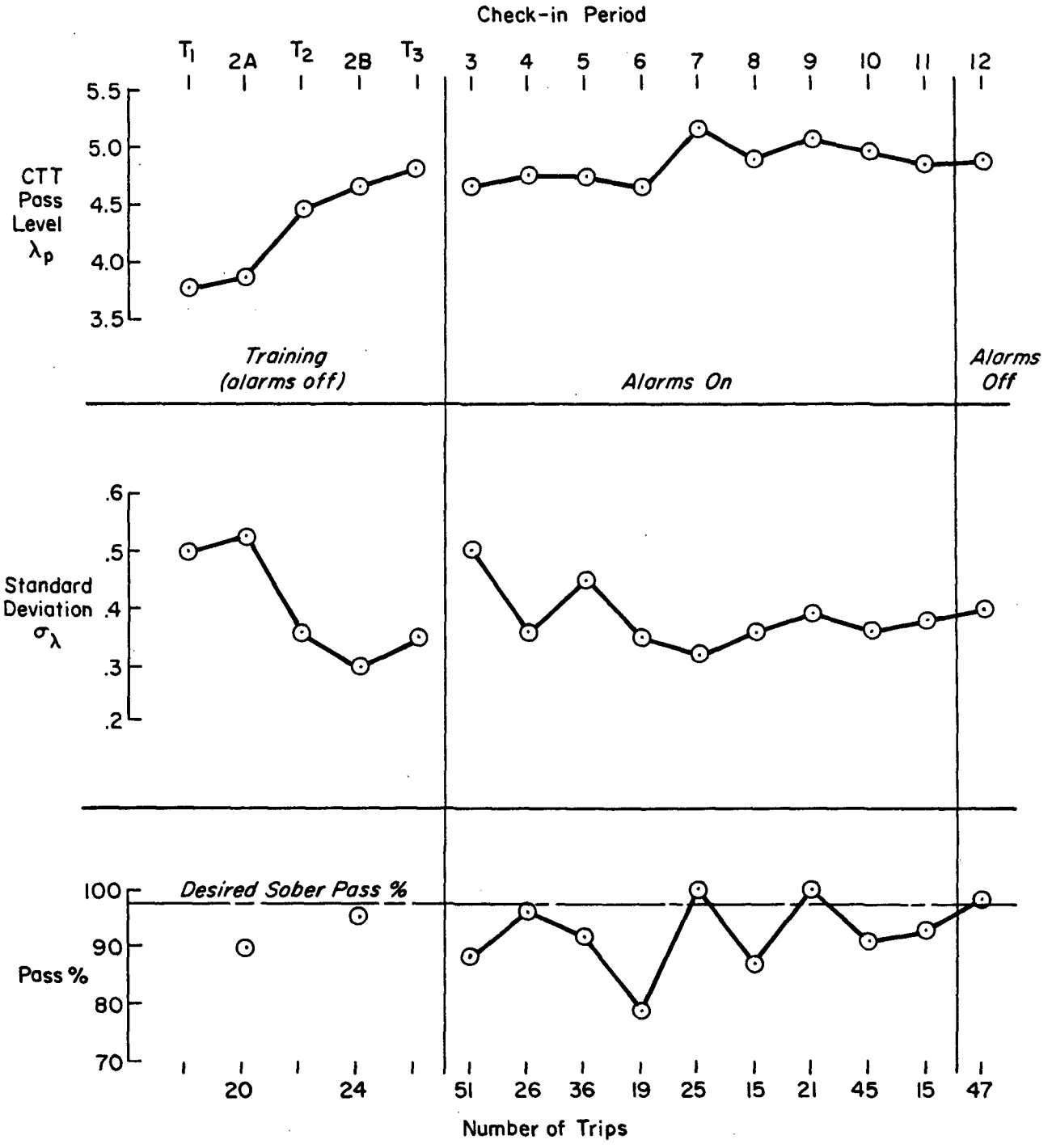
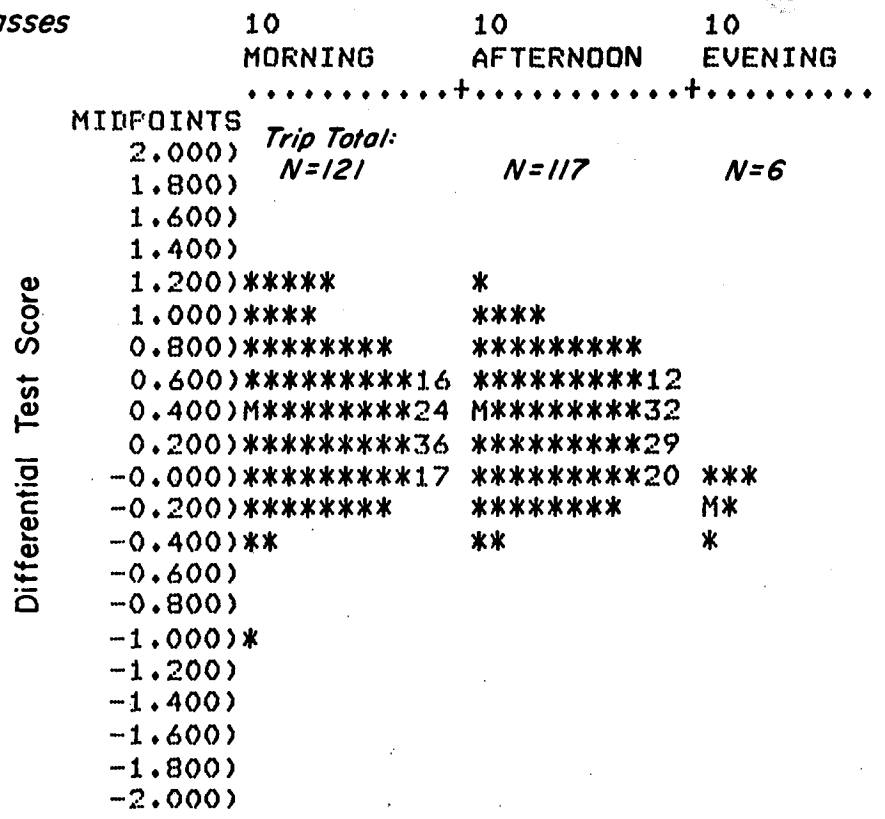


Figure I-26. Biweekly Performance Data for Subject 10

a) Passes



b) Failures

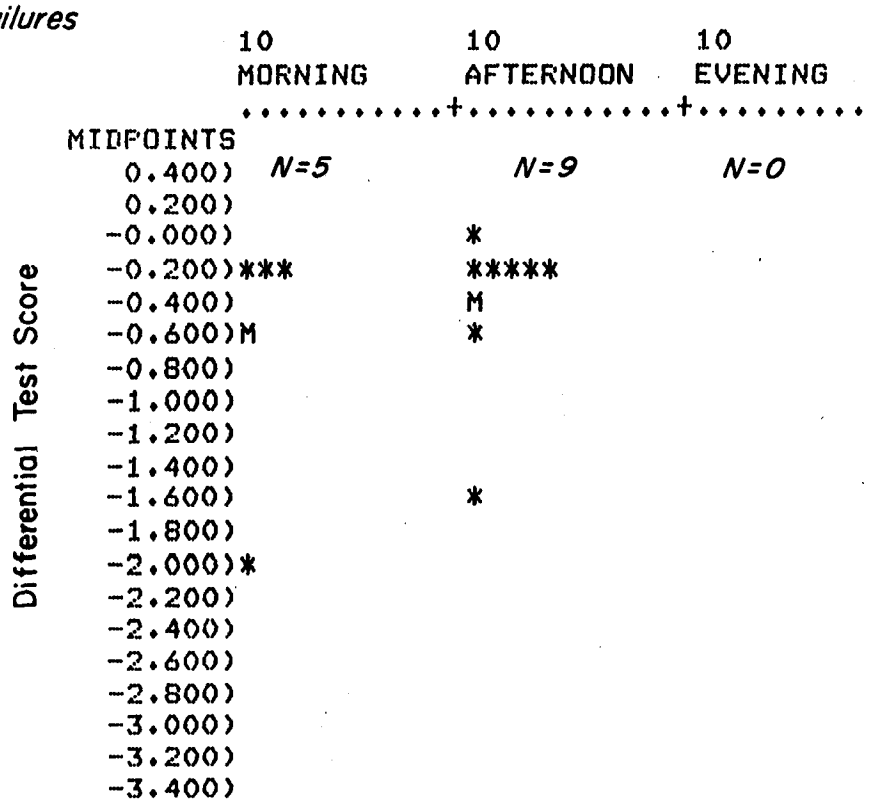


Figure I-27. Differential Test Score Histograms for Subject 10

Subject 11

Subject 11 was 30 years old and worked as a waitress at a hotel near Los Angeles International Airport. Her own car was a 1975 Ford Fairmont. She was very conscientious and kept meticulous records in her log book. About halfway through the program she appeared to be much more relaxed about the whole idea of taking a test in order to drive, and commented that the car did not scare here anymore. Her car was damaged when a milk truck hit her in a parking lot which prevented the driver's door from opening. This was one of four accidents sustained by various cars while in the subjects' possession. Subject No. 11 drove 4,013 miles and had 8 test failures. She was in the average range for miles driven and number of trips. Figure I-28 shows very consistent, stable performance over the experimental period. The histograms in Fig. I-29 show heavy afternoon driving with low test failures.

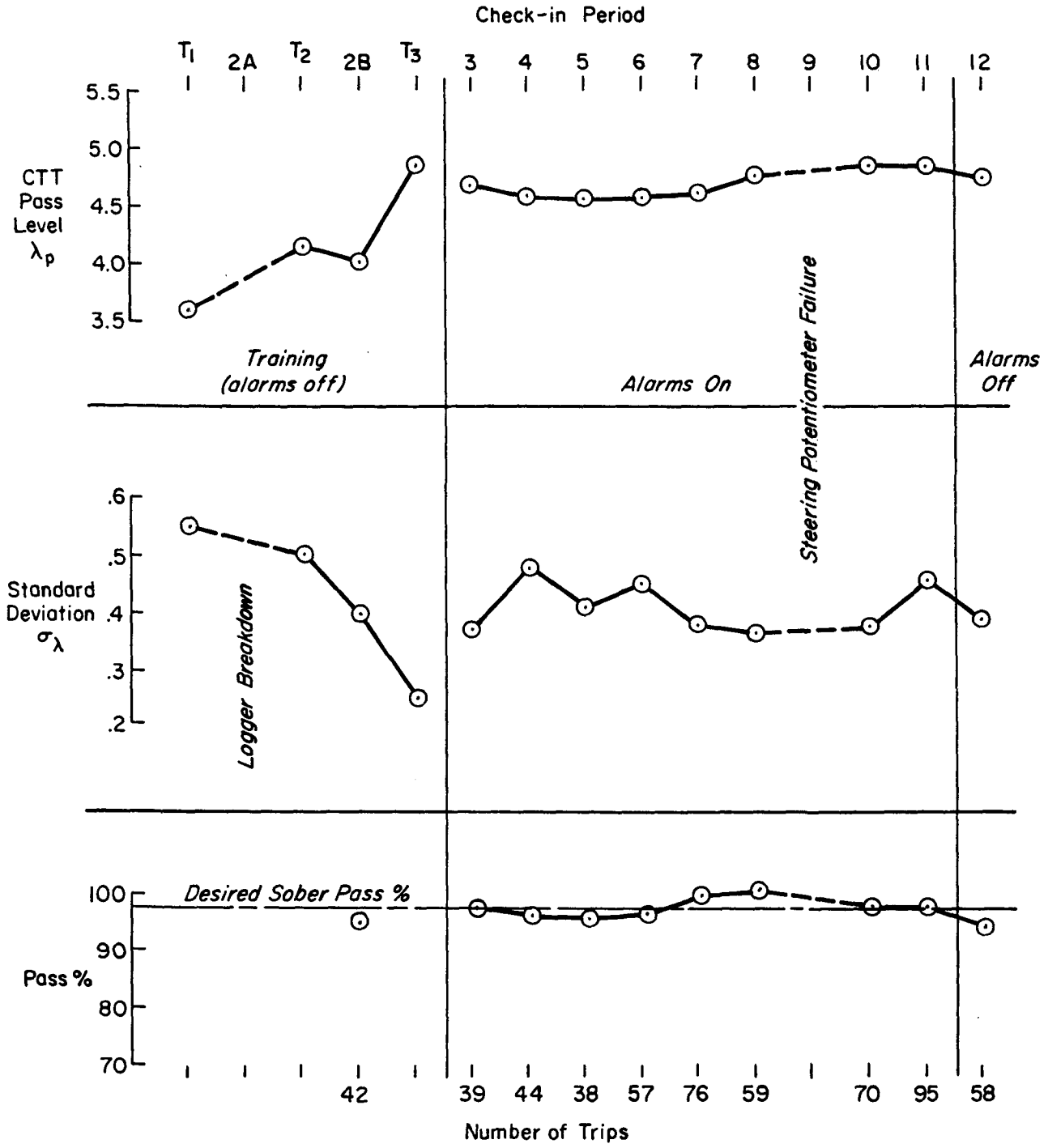
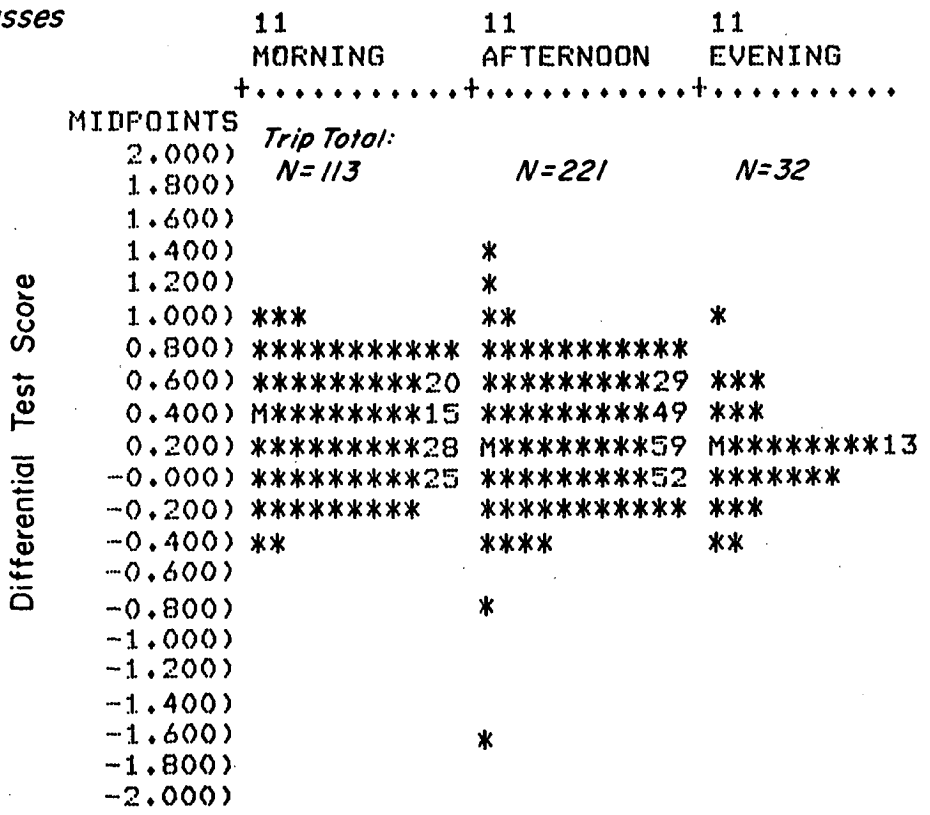


Figure I-28. Biweekly Performance Data for Subject 11

a) Passes



b) Failures

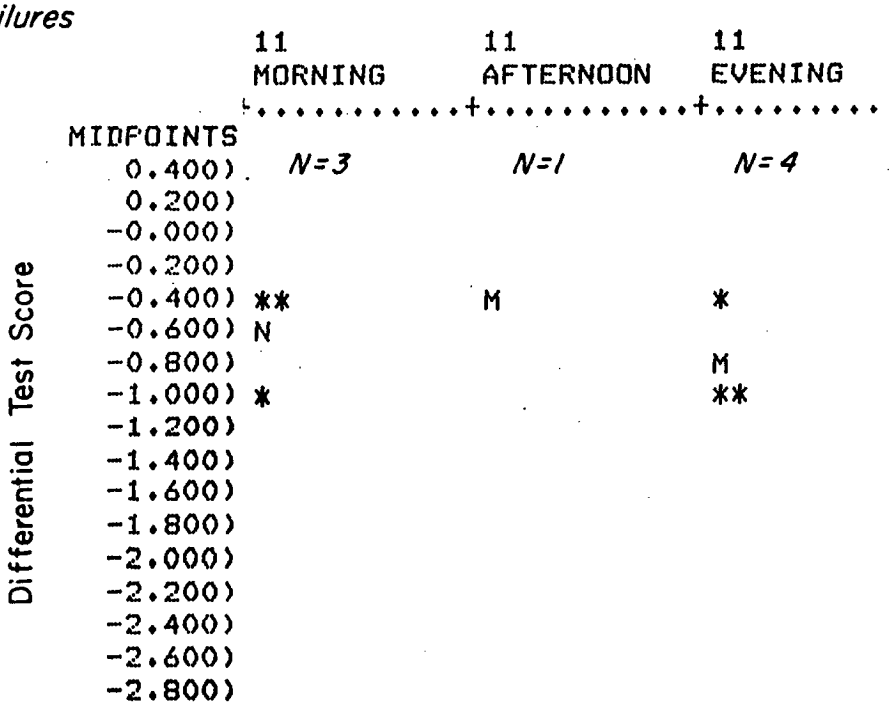


Figure I-29. Differential Test Score Histograms for Subject 11

Subject 12

Subject 12 was 40 years old and normally drove a 1977 Dodge van. She said she was embarrassed about being in the program. Shortly after she was assigned her DDWS vehicle an article on the DDWS program appeared in the Los Angeles Times. She was mortified and felt that all her friends would recognize her as a drunk driver. She parked as far as possible from home and from work so that no one would notice the flashing lights while she was taking the test. She drove as little as possible (to work and to bowling), and otherwise asked her friends to drive. Her DDWS car was damaged when a 16 year old driver ran into a fence that fell on the car. She drove 1,673 miles and had 17 test failures, 7 of which were alcohol impaired. The deterred drives occured on her bowling night, as did her arrests. She said she would bowl and drink. When she failed the test she went back and had a sandwich and coffee, and waited until she could pass.

Subject 12's overall low mileage and low number of trips combined with 11 deterred drives, gave her a high deterred drive rate. In her final debriefing she said the program was effective in deterring drunk driving. She also said if she had to make the choice about participation in the program again she would do it. She also stated that she told 25-30 people about her participation in the program, so she apparently had recovered from her initial embarrassment.

Figure I-30 shows a decline from the immediate post training level, which was characteristic of several subjects' performance. The higher pass level in the eleventh period was most likely due to a reduction in anxiety in the subject. By her own report, the psychological difference between alarms on and alarms off made a big difference in performance. The histograms in Fig. I-31 show that most of Subject 12's driving and test failures took place in the afternoon. Her failures after bowling occurred in this time period because she bowled until about 7:30 p.m. The afternoon time period of the histograms is 12 noon to 8 p.m.

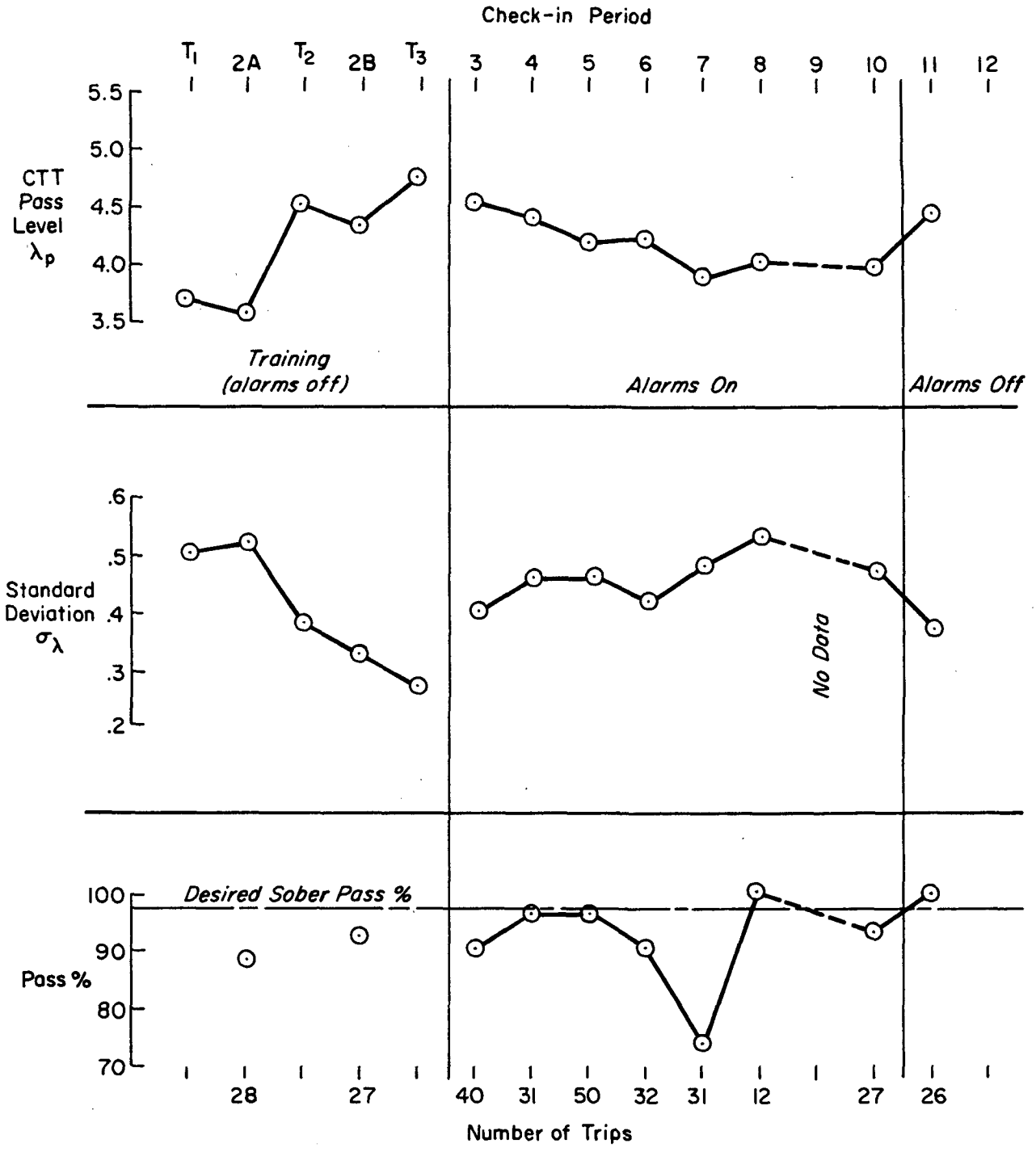
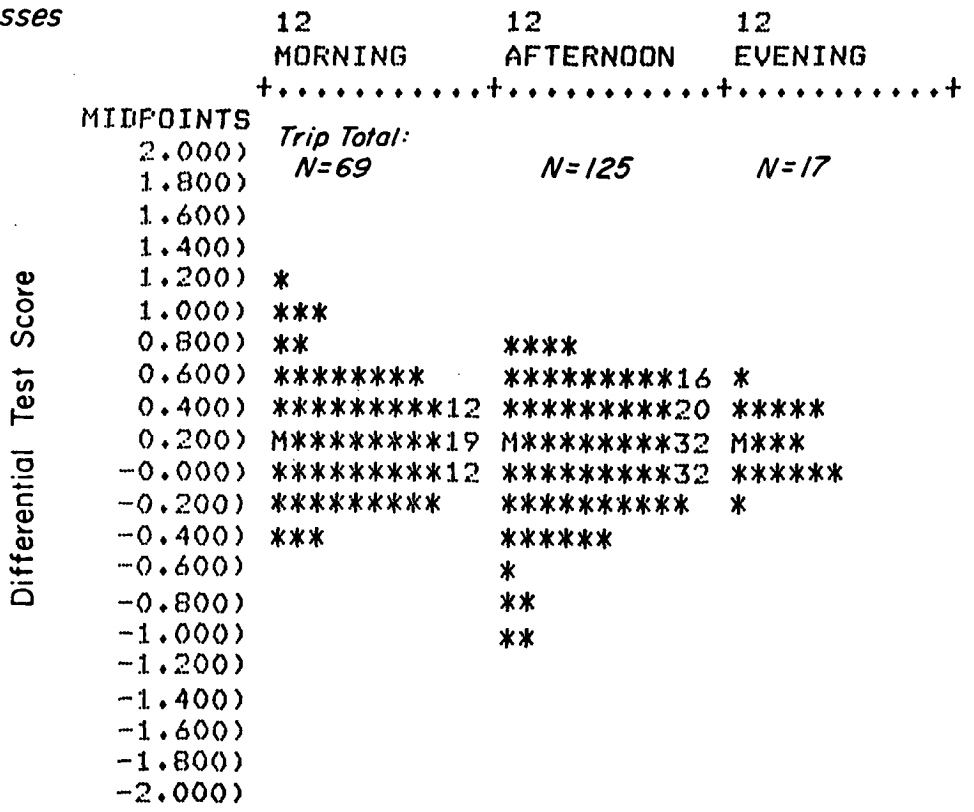


Figure I-30. Biweekly Performance Data for Subject 12

a) Passes



b) Failures

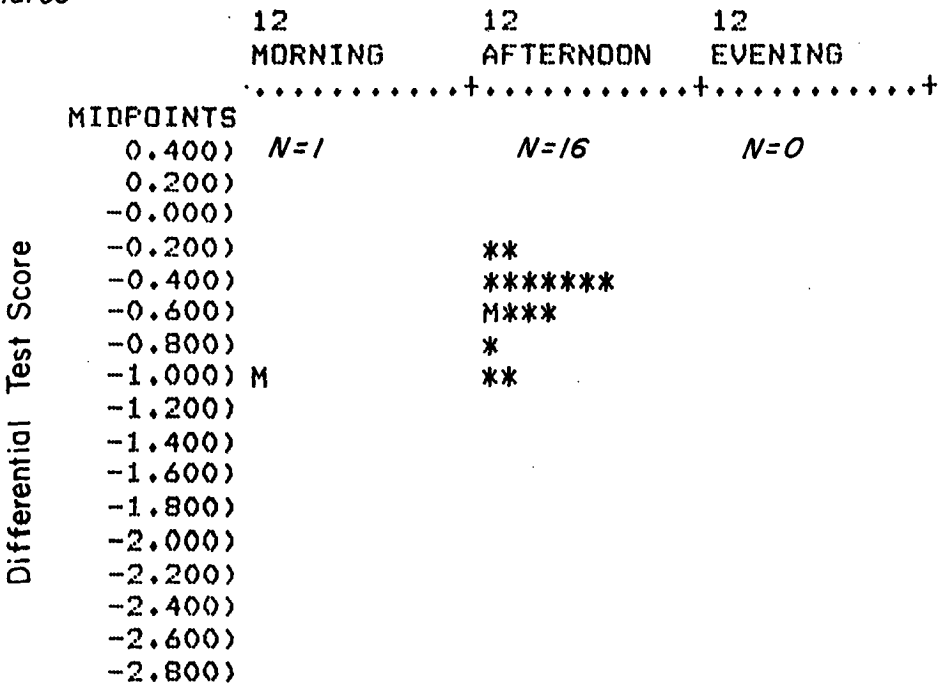


Figure I-31. Differential Test Score Histograms for Subject 12

Subject 13

Subject 13 was 31 years old, and his own vehicle was a 1978 Oldsmobile Cutlass. He became unemployed shortly after starting the program. (He worked for a film marketing company that went bankrupt when they copied Jaws. Universal Studios sued them and won.) His pass level was the lowest of any of the subjects -- it was never set higher than 3.1. Even at this low level, he had deterred drives and would fail when he was in a hurry. Subject 13 seemed immature and somewhat detached from reality. He drove his own car one time when he couldn't pass the test in the DDWS and got a speeding ticket. He claimed that it didn't occur to him that he was violating probation. He had a probation hearing, paid another fine and continued the project (see Exhibit I-1 following this narrative). He drove into a restricted area of a naval base one night while attending a wedding. He had no trouble passing the test while held at gun point by a guard.

He joined Stop for Life right after his second arrest and maintained throughout his biweekly check-ins that he was not drinking. During the final debriefing he admitted that he did drink and also that one of his deterred drives was due to cocaine. The incidents recorded in Figure I-33 occurred during the period when he was "not drinking." The pattern of test failure is very similar to other test failures in which the subjects admit to being intoxicated. When discussing the failure during the biweekly check-in the subject would only admit to anxiety and anger.

Figure I-33 shows that his CTT pass levels are very stable over the experimental period. The pattern and the shape of the curve is similar to those of other subjects, the only difference is that the pass level is almost 2 points lower. This has positive implications for using the CTT on a wide scale and accommodating for individual differences. He drove 1,763 miles and made 968 trips both of which are in the high range. His deterred drive rate was below average. He expressed interest in buying a system for his own car. The histograms in Fig. I-34 show less driving in the evening hours and test failures throughout the day and night.

EXHIBIT I-1

SYSTEMS TECHNOLOGY, INC.

13766 SOUTH HAWTHORNE BOULEVARD • HAWTHORNE, CALIFORNIA 90250-7083 • PHONE (213) 679-2281

In reply refer to:

26 January 1982

West Los Angeles Court
1633 S. Purdue Ave.
Los Angeles, CA 90025

Attention: Ed Sacchette
Public Health Investigator

Dear Mr. Sacchette,

On January 26, 1982 Mr. Subject 13 came to STI for his routine bi-weekly appointment for the DDWS research project. During the standard debriefing he informed me that he received a speeding ticket while driving his own car. He had tried the DDWS test and was given the 10 minute wait period after two attempts, rather than four attempts as programmed into the equipment. It is not clear whether this was due to a machine malfunction or as a result of his not understanding the system. It appears that the arresting officer was not aware of Subject 13's participation in the program, and thus, that he was driving without a valid license.

Subject 13 has been most co-operative throughout his participation in this program, however, it seems that he is unable to comprehend some of the more subtle aspects of the system and the terms of his probation. In other words, it is my impression that he did not intentionally violate the terms of his probation. He stated that he was taking a small child somewhere under emergency conditons.

If I can be of further assistance please call me. I am willing to be present at a hearing if it is required.

Very truly yours,

SYSTEMS TECHNOLOGY, INC.

Marcia L. Cook
Research Assistant

MLC/war

```
18 7 18.3319                3.1          A-1----                6:19P MAR 13 82 2 13 1
18 7 18.3394   27   27        3.7  0.6 D   79                   6:20P MAR 13 82 2 13 1
18 7 18.3833  185  158                  B  2                    6:23P MAR 13 82 2 13 1
18 7 18.4653                3.1          A-1----                6:27P MAR 13 82 2 13 1
18 7 18.4664    4    4                  B  2                    6:27P MAR 13 82 2 13 1
18 7 18.4669                3.1          A-1----                6:28P MAR 13 82 2 13 1
18 7 18.4708   14   14        2.5 -0.6 D   49                   6:28P MAR 13 82 2 13 1
18 7 18.4753   30   16        2.6 -0.5 D   49                   6:28P MAR 13 82 2 13 1
18 7 18.4825   56   26        2.8 -0.3 D   49                   6:28P MAR 13 82 2 13 1
18 7 18.4881   76   20        3.3  0.2 D   79                   6:29P MAR 13 82 2 13 1
18 7 18.5533  311  235                  B  2                    6:33P MAR 13 82 2 13 1
18 7 22.1061                3.1          A-1----               10: 6P MAR 13 82 2 13 1
18 7 22.1072    4    4                  B  2                   10: 6P MAR 13 82 2 13 1
18 7 22.1078                3.1          A-1----               10: 6P MAR 13 82 2 13 1
18 7 22.1139   22   22        2.0 -1.1 D   49                   10: 6P MAR 13 82 2 13 1
18 7 22.1211   48   26        2.0 -1.1 D   49                   10: 7P MAR 13 82 2 13 1
18 7 22.1247   61   13        1.9 -1.2 D   49  DD               10: 7P MAR 13 82 2 13 1
18 7 22.1306   82   21        1.9 -1.2 D   49                   10: 7P MAR 13 82 2 13 1
18 7 22.3042  707  625                  B  2                   10:18P MAR 13 82 2 13 1
18 7 22.4808                3.1          A-1----               10:28P MAR 13 82 2 13 1
18 7 22.4822    5    5                  B  2                   10:28P MAR 13 82 2 13 1
18 7 22.4828                3.1          A-1----               10:28P MAR 13 82 2 13 1
18 7 22.4875   17   17        2.1 -1.0 D    4                  10:29P MAR 13 82 2 13 1
18 7 22.4911   30   13        1.7 -1.4 D    4  DD              10:29P MAR 13 82 2 13 1
18 7 22.4955   46   16        2.0 -1.1 D    4                  10:29P MAR 13 82 2 13 1
18 7 22.5008   65   19        2.3 -0.8 D    4                  10:30P MAR 13 82 2 13 1
18 7 22.5142  113   48                  E     5                 10:30P MAR 13 82 2 13 1
18 7 22.5208  137   24                  E     5                 10:31P MAR 13 82 2 13 1
18 7 22.5289  166   29                  E     5                 10:31P MAR 13 82 2 13 1
18 7 22.5356  190   24                  E     5                 10:32P MAR 13 82 2 13 1
18 7 22.5492  239   49                  E     5                 10:32P MAR 13 82 2 13 1
18 7 22.7244  870  631                  B  2                   10:43P MAR 13 82 2 13 1
18 7 23.8055                3.1          A-1----              11:48P MAR 13 82 2 13 1
18 7 23.8072    6    6                  B  2                   11:48P MAR 13 82 2 13 1
18 7 23.8086                3.1          A-1----              11:48P MAR 13 82 2 13 1
18 7 23.8222   49   49        2.4 -0.7 D   49                   11:49P MAR 13 82 2 13 1
18 7 23.8322   85   36        2.5 -0.6 D   49                   11:49P MAR 13 82 2 13 1
18 7 23.8375  104   19        2.4 -0.7 D   49  DD               11:50P MAR 13 82 2 13 1
18 7 23.8425  122   18        2.7 -0.4 D   49                   11:50P MAR 13 82 2 13 1
19 1  0.0161  747  625                  B  2                    12: 0  MAR 14 82 2 13 1
19 1  0.0189                3.1          A-1----                12: 1  MAR 14 82 2 13 1
19 1  0.0228   14   14        2.9 -0.2 D   49                   12: 1  MAR 14 82 2 13 1
19 1  0.0278   32   18        2.4 -0.7 D   49                   12: 1  MAR 14 82 2 13 1
19 1  0.0328   50   18        2.9 -0.2 D   49                   12: 1  MAR 14 82 2 13 1
19 1  0.0383   70   20        3.0 -0.1 D   49                   12: 2  MAR 14 82 2 13 1
19 1  0.2122  696  626                  B  2                    12:12  MAR 14 82 2 13 1
19 1  0.2181                3.1          A-1----                12:13  MAR 14 82 2 13 1
19 1  0.2219   14   14                  B  2                    12:13  MAR 14 82 2 13 1
19 1  0.2225                3.1          A-1----                12:13  MAR 14 82 2 13 1
19 1  0.2261   13   13        2.5 -0.6 D   49                   12:13  MAR 14 82 2 13 1
19 1  0.2303   28   15        2.0 -1.1 D   49                   12:13  MAR 14 82 2 13 1
19 1  0.2364   50   22        2.7 -0.4 D   49                   12:14  MAR 14 82 2 13 1
19 1  0.2436   76   26        2.5 -0.6 D   49  DD               12:14  MAR 14 82 2 13 1
19 1  0.4175  702  626                  B  2                    12:25  MAR 14 82 2 13 1
19 1  0.4458                3.1          A-1----                12:26  MAR 14 82 2 13 1
19 1  0.4483    9    9        1.8 -1.3 D   49                   12:26  MAR 14 82 2 13 1
19 1  0.4542   30   21        2.1 -1.0 D   49  DD               12:27  MAR 14 82 2 13 1
19 1  0.4589   47   17        2.0 -1.1 D   49                   12:27  MAR 14 82 2 13 1
19 1  0.4642   66   19        2.7 -0.4 D   49                   12:27  MAR 14 82 2 13 1
19 1  0.6381  692  626                  B  2                    12:38  MAR 14 82 2 13 1
19 1  0.6517                3.1          A-1----                12:39  MAR 14 82 2 13 1
19 1  0.6533    6    6                  B  2                    12:39  MAR 14 82 2 13 1
19 1  0.6536                3.1          A-1----                12:39  MAR 14 82 2 13 1
19 1  0.6583   17   17        2.7 -0.4 D   49                   12:39  MAR 14 82 2 13 1
19 1  0.6642   38   21        1.6 -1.5 D   49                   12:39  MAR 14 82 2 13 1
19 1  0.6714   64   26        2.7 -0.4 D   49                   12:40  MAR 14 82 2 13 1
19 1  0.6781   88   24        3.2  0.1 D   79                   12:40  MAR 14 82 2 13 1
19 1  1.6678 3651 3563                  B  2                     1:40  MAR 14 82 2 13 1
19 1  8.2189                3.1          A-1----                 8:13  MAR 14 82 2 13 1
19 1  8.2214    9    9                  B  2                    8:13  MAR 14 82 2 13 1
19 1  8.2219                3.1          A-1----                8:13  MAR 14 82 2 13 1
19 1  8.2222    1    1                  B  2                    8:13  MAR 14 82 2 13 1
19 1  8.2253                3.1          A-1----                8:13  MAR 14 82 2 13 1
19 1  8.2306   19   19        3.7  0.6 D   79                   8:13  MAR 14 82 2 13 1
19 1  8.6967 1697 1678                  B  2                    8:41  MAR 14 82 2 13 1
19 1  8.9500                3.1          A-1----                8:57  MAR 14 82 2 13 1
19 1  8.9544   16   16        3.4  0.3 D   79                   8:57  MAR 14 82 2 13 1
19 1  9.3475 1431 1415                  B  2                    9:20  MAR 14 82 2 13 1
```

had to move car across street

(had something to eat). Ate 15 min

sat + fumed

was nervous waited

Figure I-32. Excerpt from Event Log Subject 13, Check-in No. 9

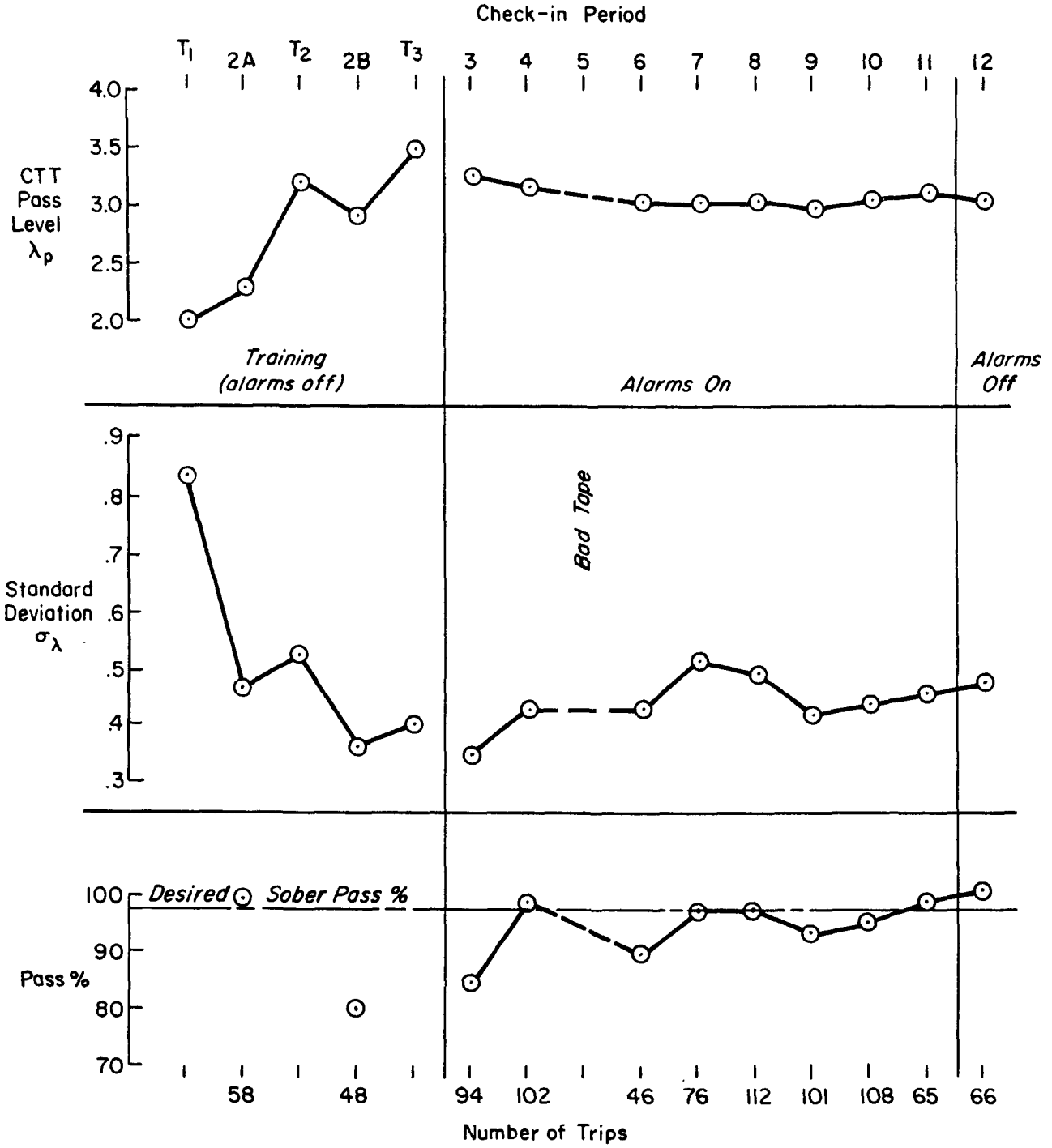
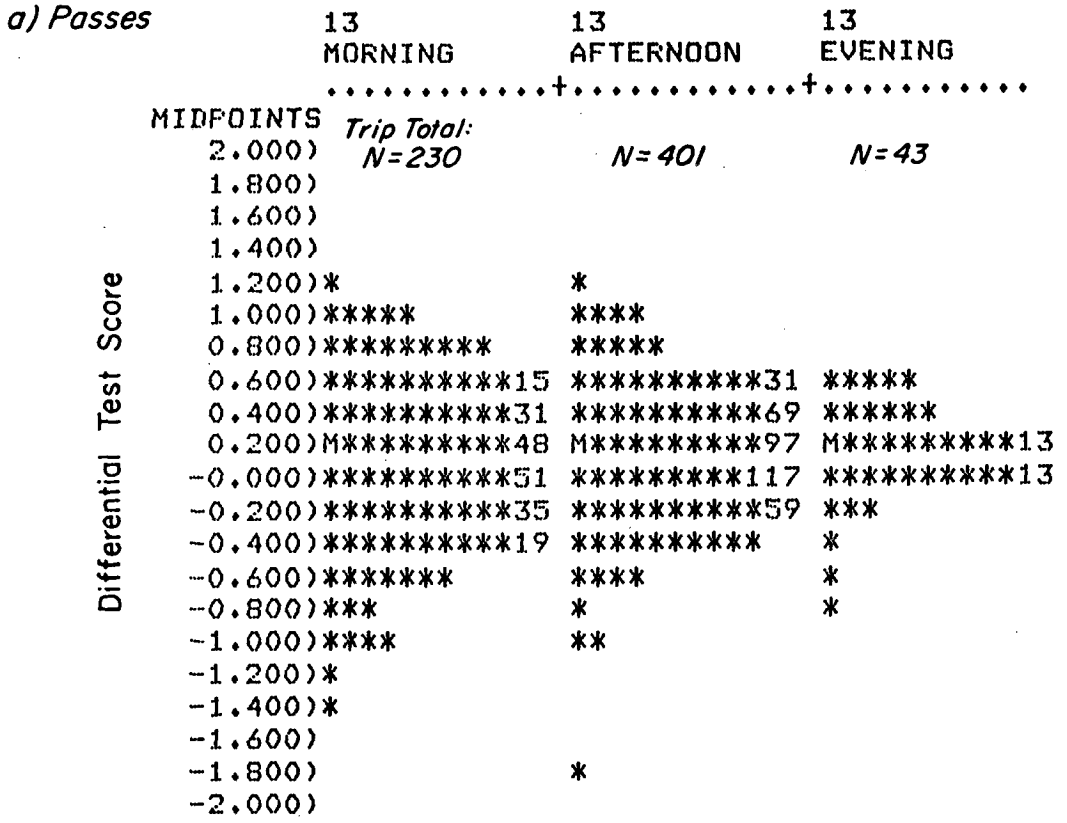


Figure I-33. Biweekly Performance Data for Subject 13

a) Passes



b) Failures

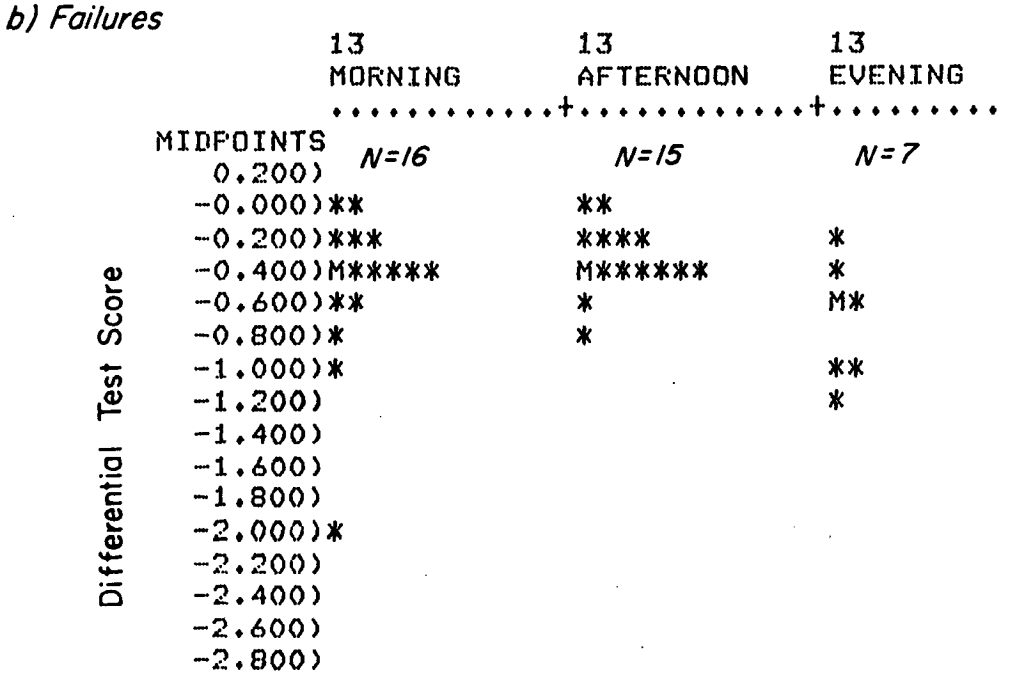


Figure I-34. Differential Test Score Histograms for Subject 13

Subject 14

Subject 14 was 42 and worked as a computer electrician and drove a 1970 Lincoln Continental. He started on Workman's Compensation shortly after beginning the program. He was also part owner of a bar and kept up vending machines. He usually closed the bar at 2:00 a.m. and then made his vending machine rounds. He would have trouble passing the test at 7:30 a.m. when he drove his son to school. This subject was very belligerent at the outset. Over the course of the program he became committed to the concept of the DDWS. In his words -- he grew to love the car.

This subject was under the false impression that the first of the four trials was more difficult than the subsequent trials (there is no systematic difference between trials on the CTT). He would enter the car and purposely fail the first trial. He would then concentrate for the second trial and get a very high score. In operant conditioning terms, this is known as superstitious responding. The subject could pass the second trial, not because it was easier, but because he was using the elapsed time to focus his concentration. Figure I-35 shows an event report with his typical response pattern. The first score is 1.2 which actually represents a sharp pull on the steering wheel. If the test was activated with no response at all from the subject, the score would be about 1.5 or 1.6. It seems that the subject was impatient to get the 1st trial out of the way. Figure I-36 shows the cumulative probability plot for all trials during the 6th biweekly period. The upper portion of this curve is reflective of Subject 14's sober performance on the CTT. The line fitted to this data is then used to determine the pass criterion at the subjects' 40 percent level. This procedure allows fast, accurate determination of the pass criterion and the influence of odd response patterns is kept to a minimum. This is fortunate because it would have been otherwise very difficult to deal with bahavior patterns such as evidenced by Subject 14.

It is interesting to note that due to Subject 14's response pattern he was putting himself on a 1 pass out of 3 attempts strategy which is

more difficult than the 1 pass out of 4 tries the other subjects had. Nevertheless, his sober failure rate was only 2.1 percent — just under the 2.5 percent we were aiming for. Subject 14 drove 10,823 miles and had the 2nd highest number of trips. He had 5 alcohol impaired failures for a very low rate of deterred drives. Aside from superstitious responding, his performance was fairly stable as shown in Fig. I-37. The pass histogram (Fig. I-38) appears to be bimodal due to his superstitious responding pattern. His failure frequency is faily constant throughout the day, however, his failure rate is higher during the evening hours due to a lower total trip frequency.

```
20 4 15.2789   37   37    5.2  0.4 D   79        3:16P MAR 24 82 2 14 5
20 4 15.9300 2381 2344              B  2        3:55P MAR 24 82 2 14 5
20 4 16.4836              4.8       A-1----     4:29P MAR 24 82 2 14 5
20 4 16.5097   94   94    5.1  0.3 D   79        4:30P MAR 24 82 2 14 5
20 4 16.7033  791  697              B  2        4:42P MAR 24 82 2 14 5
20 4 16.7483              4.8       A-1----     4:44P MAR 24 82 2 14 5
20 4 16.7572   32   32              B  2        4:45P MAR 24 82 2 14 5
20 5  0.0906              4.8       A-1----    12: 5  MAR 25 82 2 14 5
20 5  0.0917    4    4    1.3 -3.5 D   4       12: 5  MAR 25 82 2 14 5
20 5  0.1094   68   64    5.0  0.2 D   79      12: 6  MAR 25 82 2 14 5
20 5  0.4458 1279 1211              B  2        12:26  MAR 25 82 2 14 5
20 5  8.2175              4.8       A-1----     8:13   MAR 25 82 2 14 5
20 5  8.2186    4    4    1.2 -3.6 D   4        8:13   MAR 25 82 2 14 5
20 5  8.2261   31   27    4.6 -0.2 D   49       8:13   MAR 25 82 2 14 5
20 5  8.2314   50   19    2.8 -2.0 D   4        8:13   MAR 25 82 2 14 5
20 5  8.2458  102   52    5.6  0.8 D   7        8:14   MAR 25 82 2 14 5
20 5  8.4383  795  693              B  2        8:26   MAR 25 82 2 14 5
20 5  8.9783              4.8       A-1----     8:58   MAR 25 82 2 14 5
20 5  8.9872   32   32    4.7 -0.1 D   49       8:59   MAR 25 82 2 14 5
20 5  9.0017   84   52    5.6  0.8 D   79       9: 0   MAR 25 82 2 14 5
20 5  9.0986  433  349              B  2        9: 5   MAR 25 82 2 14 5
20 5 12.5378              4.8       A-1----    12:32P MAR 25 82 2 14 5
20 5 12.5617   86   86    5.2  0.4 D   79       12:33P MAR 25 82 2 14 5
20 5 12.6183  290  204    1.2 -3.6 D   49       12:37P MAR 25 82 2 14 5
20 5 12.6250  314   24    3.1 -1.7 D   4        12:37P MAR 25 82 2 14 5
20 5 12.6369  357   43    5.4  0.6 D   7        12:38P MAR 25 82 2 14 5
20 5 12.8383 1082  725              B  2        12:50P MAR 25 82 2 14 5
20 5 13.3367              4.8       A-1----     1:20P MAR 25 82 2 14 5
20 5 13.3378    4    4    1.2 -3.6 D   49       1:20P MAR 25 82 2 14 5
20 5 13.3511   52   48    5.7  0.9 D   79       1:21P MAR 25 82 2 14 5
20 5 13.5436  745  693              B  2        1:32P MAR 25 82 2 14 5
20 5 14.4517              4.8       A-1----     2:27P MAR 25 82 2 14 5
20 5 14.4531    5    5    1.2 -3.6 D   49       2:27P MAR 25 82 2 14 5
20 5 14.4650   48   43    5.8  1.0 D   79       2:27P MAR 25 82 2 14 5
20 5 14.6033  546  498              B  2        2:36P MAR 25 82 2 14 5
20 5 15.7444              4.8       A-1----     3:44P MAR 25 82 2 14 5
20 5 15.7456    4    4    1.2 -3.6 D   49       3:44P MAR 25 82 2 14 5
20 5 15.7656   76   72    5.6  0.8 D   79       3:45P MAR 25 82 2 14 5
20 5 16.1705 1534 1458              B  2        4:10P MAR 25 82 2 14 5
20 6  0.0717              4.8       A-1----    12: 4  MAR 26 82 2 14 5
20 6  0.0733    6    6    1.2 -3.6 D   4        12: 4  MAR 26 82 2 14 5
20 6  0.0819   37   31    5.3  0.5 D   7        12: 4  MAR 26 82 2 14 5
20 6  0.3197  893  856              B  2        12:19  MAR 26 82 2 14 5
20 6  8.0908              4.8       A-1----     8: 5   MAR 26 82 2 14 5
20 6  8.0917    3    3    1.2 -3.6 D   4        8: 5   MAR 26 82 2 14 5
20 6  8.1053   52   49    5.5  0.7 D   79       8: 6   MAR 26 82 2 14 5
20 6  8.2733  657  605              B  2        8:16   MAR 26 82 2 14 5
20 6  8.8197              4.8       A-1----     8:49   MAR 26 82 2 14 5
20 6  8.8233   13   13    2.9 -1.9 D   49       8:49   MAR 26 82 2 14 5
20 6  8.8392   70   57    4.3 -0.5 D   49       8:50   MAR 26 82 2 14 5
20 6  8.8478  101   31    5.1  0.3 D   79       8:50   MAR 26 82 2 14 5
20 6  9.0794  935  834              B  2        9: 4   MAR 26 82 2 14 5
20 6  9.2833              4.8       A-1----     9:17   MAR 26 82 2 14 5
20 6  9.2986   55   55    5.7  0.9 D   79       9:17   MAR 26 82 2 14 5
20 6  9.3403  205  150              B  2        9:20   MAR 26 82 2 14 5
20 6  9.3992              4.8       A-1----     9:23   MAR 26 82 2 14 5
20 6  9.4133   51   51    5.7  0.9 D   79       9:24   MAR 26 82 2 14 5
20 6  9.4494  181  130              B  2        9:26   MAR 26 82 2 14 5
20 6  9.8453              4.8       A-1----     9:50   MAR 26 82 2 14 5
20 6  9.8692   86   86    5.4  0.6 D   79       9:52   MAR 26 82 2 14 5
20 6 10.1189  985  899              B  2       10: 7   MAR 26 82 2 14 5
```

Figure I-35. Excerpt from Event Log of Subject 14 Showing First Trial Failures

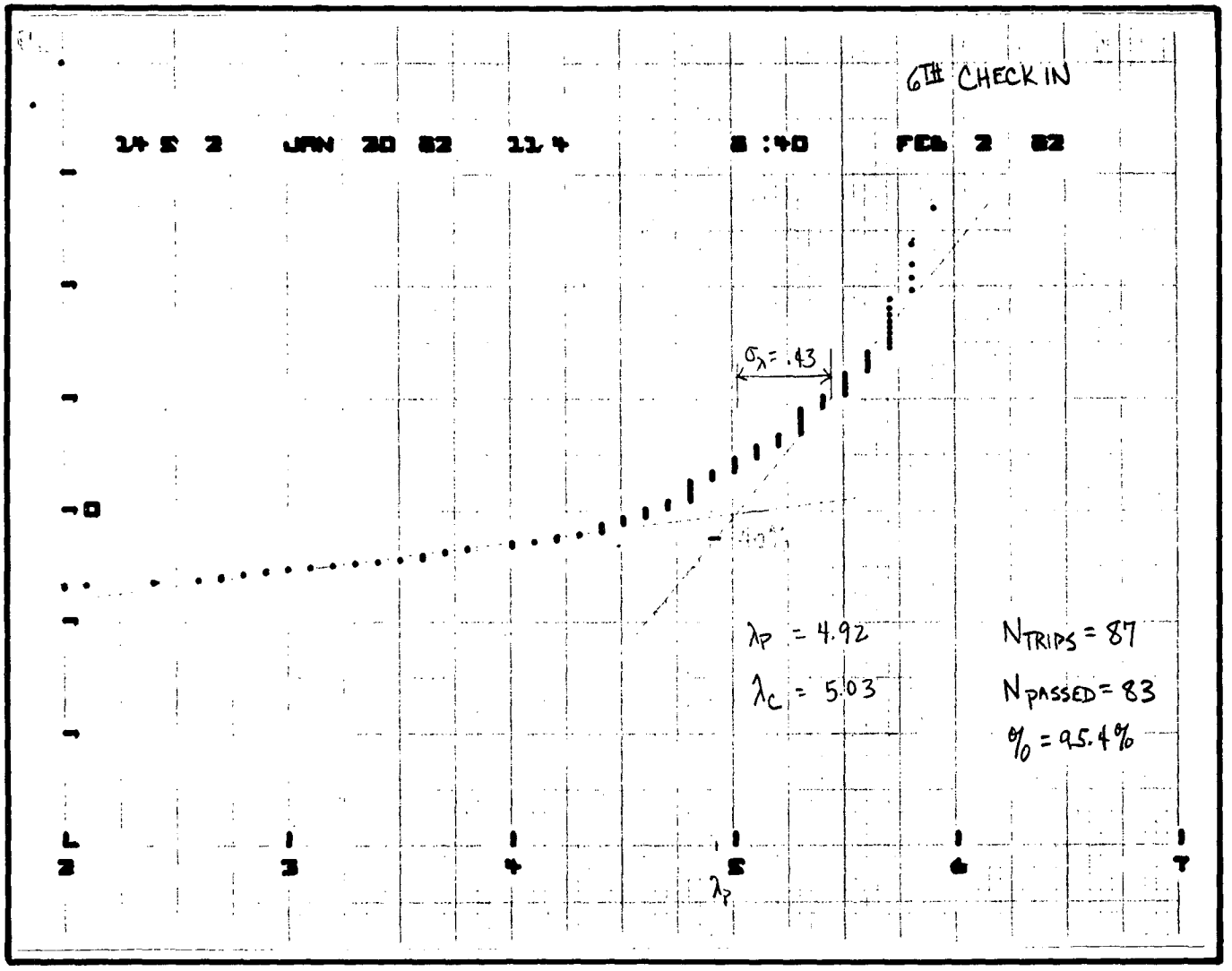


Figure I-36. Cumulative Probability Plot of CTT Scores for 6th Biweekly Period, Subject 14

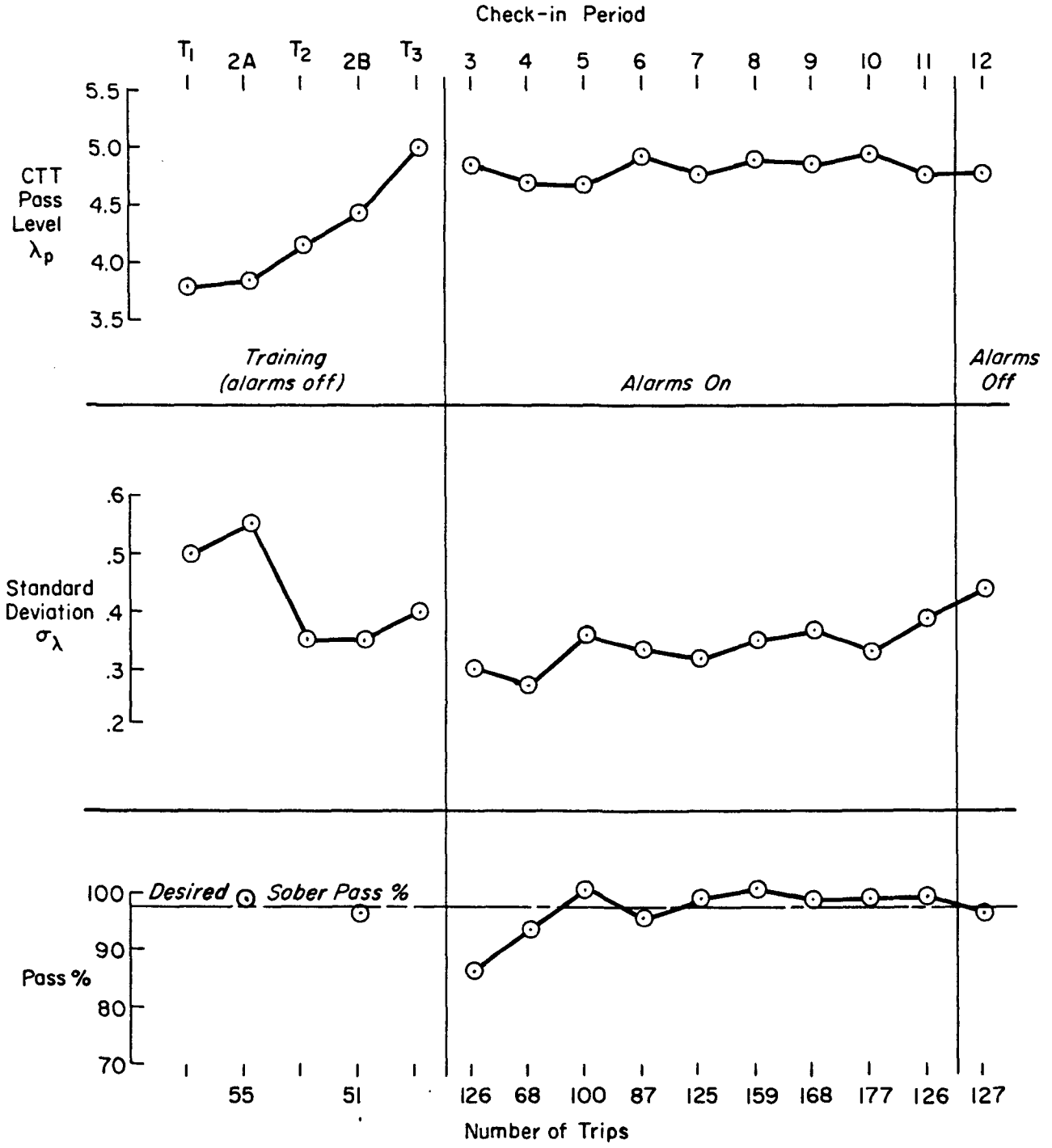
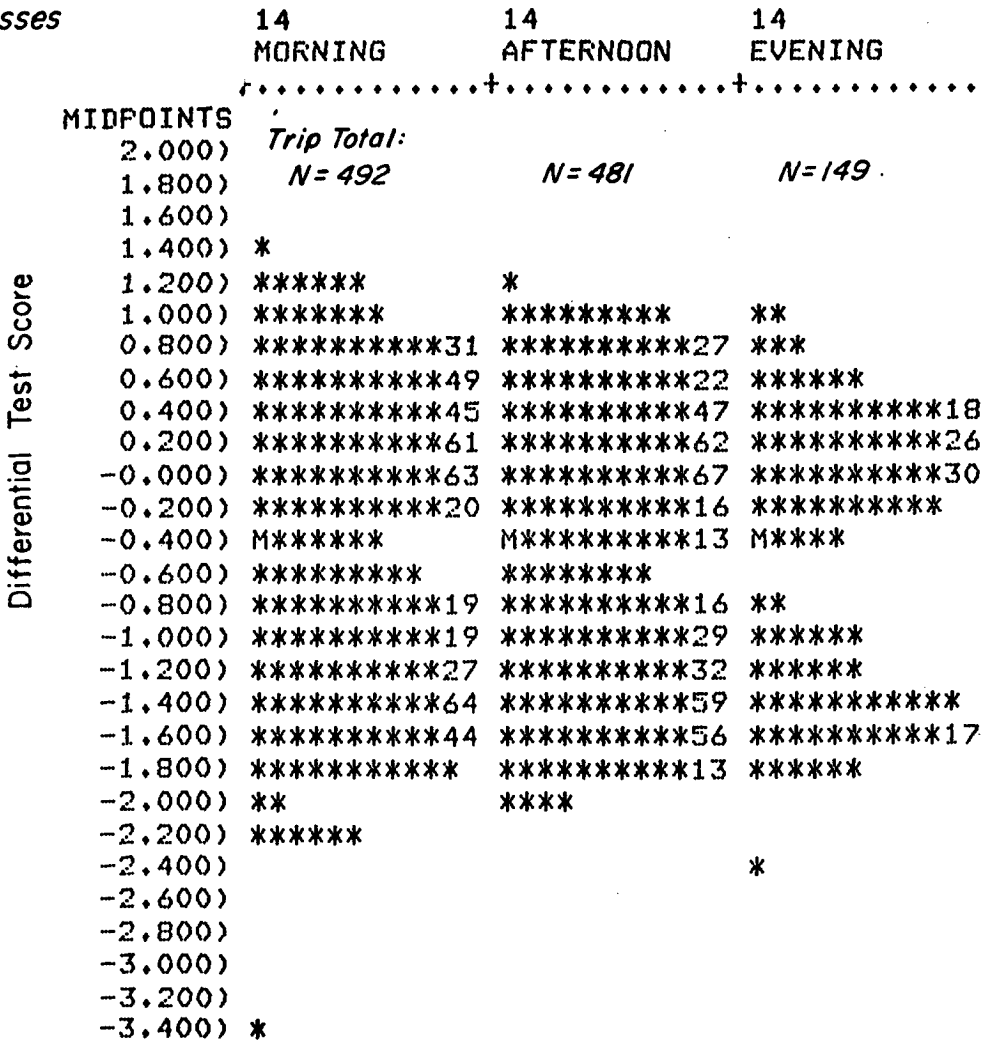


Figure I-37. Biweekly Performance Data for Subject 14

a) Passes



b) Failures

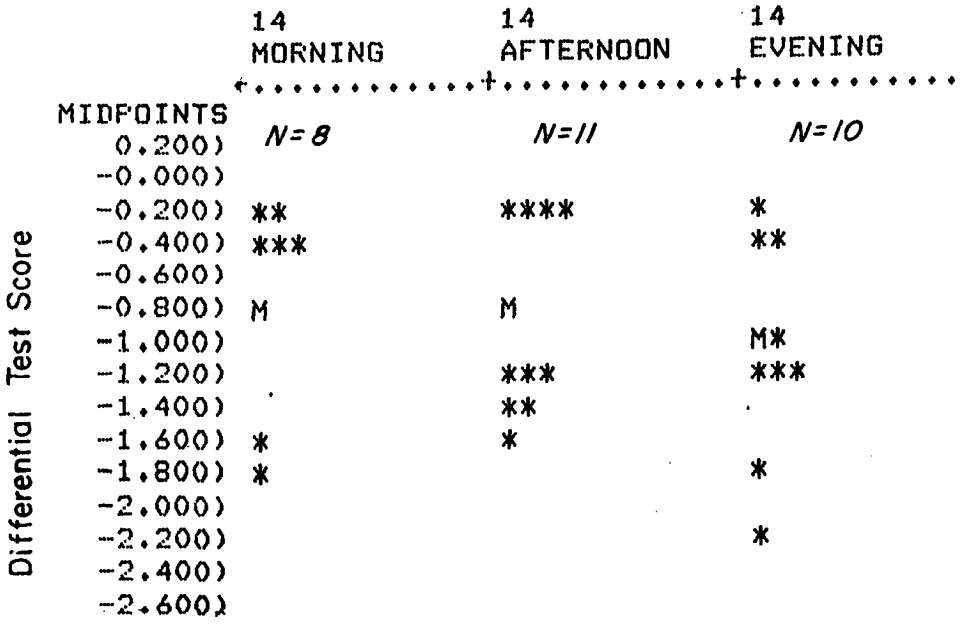


Figure I-38. Differential Test Score Histograms for Subject 14

Subject 15

Subject 15 was 27 years old and married. He was the only one to deduce that the pass level was set according to the individual's ability, and threatened to fail trials purposely in order to get an easier test. It is possible to ascertain a subject's skill level from the trials that are above the pass level, however, and since the subject must pass in order to drive, one cannot systematically lower the pass level.

After his second arrest he decided that he was alcoholic and he voluntarily stopped drinking. For this reason he claimed that the DDWS did not influence any of his drinking behavior or attitudes. Any changes, he felt, were due to the fact he quit drinking. He drove 5,705 miles and had one deterred impaired drive and admitted that it was due to marihuana. Overall miles driven and number of trips were both in the average range. His deterred drive rate was one of the lowest. Figure I-39 shows that his performance was stable with a slight learning trend. He stated in his final debriefing that he would have preferred a straight fine. He also said that he thought the DDWS was the easy way out so if he had the choice he would do it again. He felt the only hardship was that limited parking in his neighborhood made having a third car inconvenient. His own car was a 1978 Chevrolet Monza. The histograms in Fig. I-40 show frequent trips in all time periods with minimal failures.

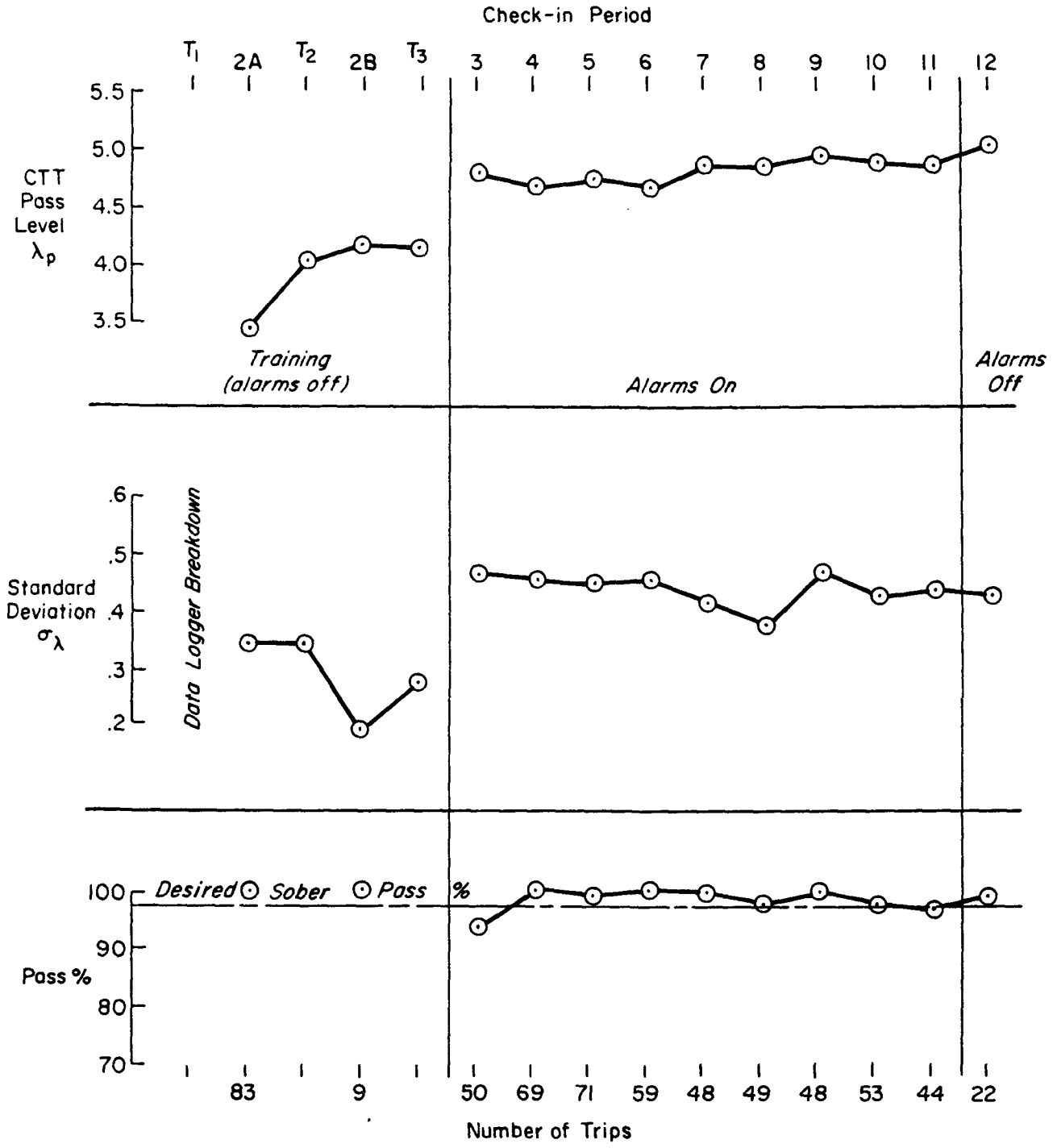
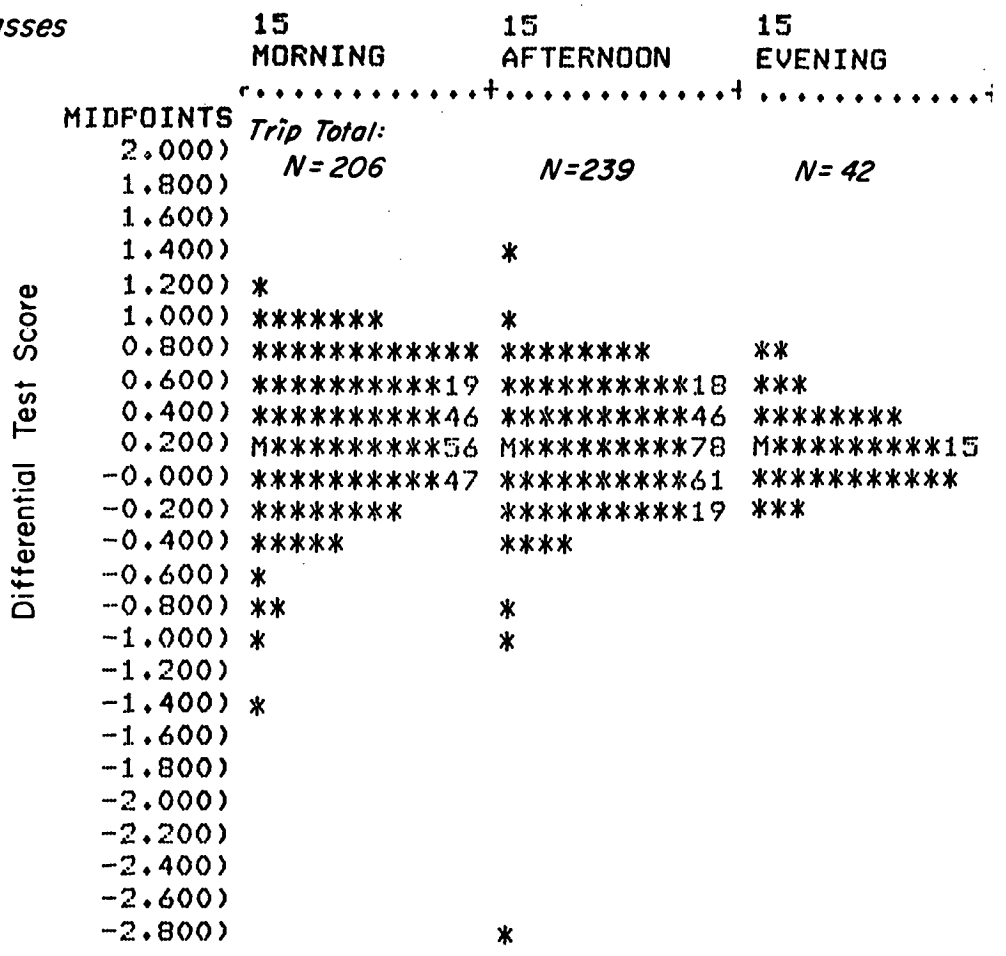


Figure K-39. Biweekly Performance Data for Subject 15

a) Passes



b) Failures

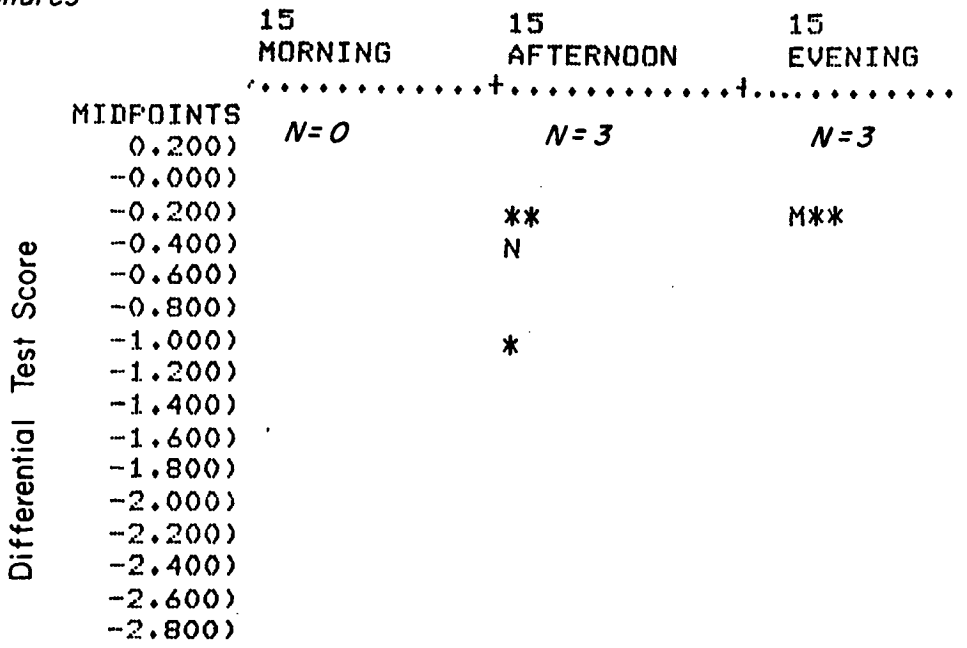


Figure I-40. Differential Test Score Histograms for Subject 15

Subject 16

Subject 16 was 49 years old and worked in the microwave department at Hughes. His own car was a 1975 Mercury Monarch. He came in every other Friday afternoon, usually in a bad mood. He felt that the computer should have been programmed so that it only asked for a test when the driver was "driving funny." He complained all the time! He also thought the computer should be programmed to know where he was and what time of day it was; then it wouldn't ask for a test at 7:00 a.m. at his house because it would know that he had not been drinking. He would be upset if he failed one trial in two weeks. He accused the experimenter of rigging the box so that the test couldn't be passed at noon on Friday. He never tried the test after drinking and had no deterred impaired drives.

Subject 16 said he would do the program again, but his first choice would be to pay a fine only. He rated the embarrassment associated with the system as minor and said the DDWS was the least restrictive of the DWI sanctions available. He drove 3,399 miles and his deterred drive rate was zero. Figure I-41 shows a strong learning trend with low variability. This probably reflects his compulsive need to pass the test at all times. The histograms in Fig. I-42 show no evening driving and very few failures.

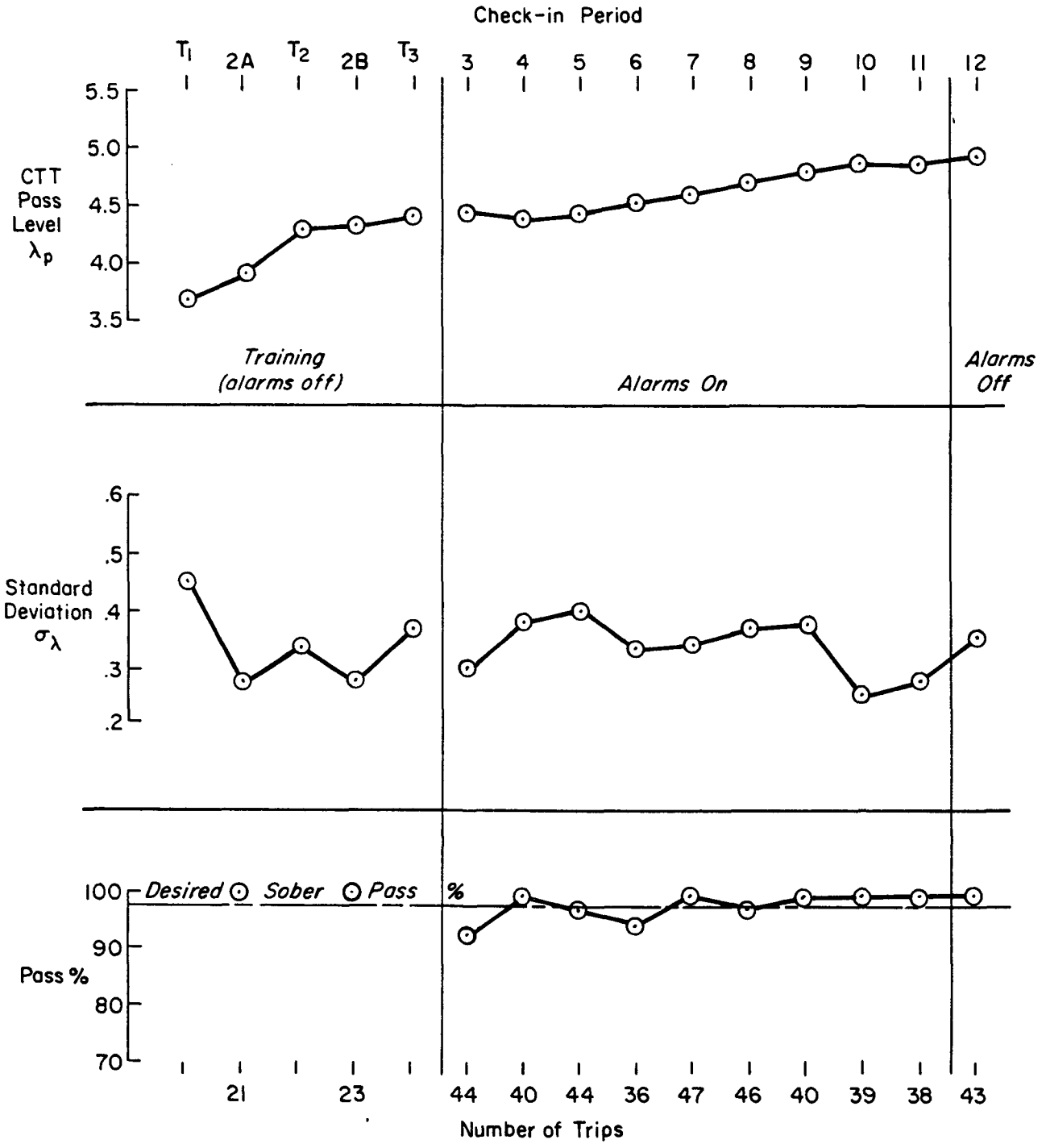
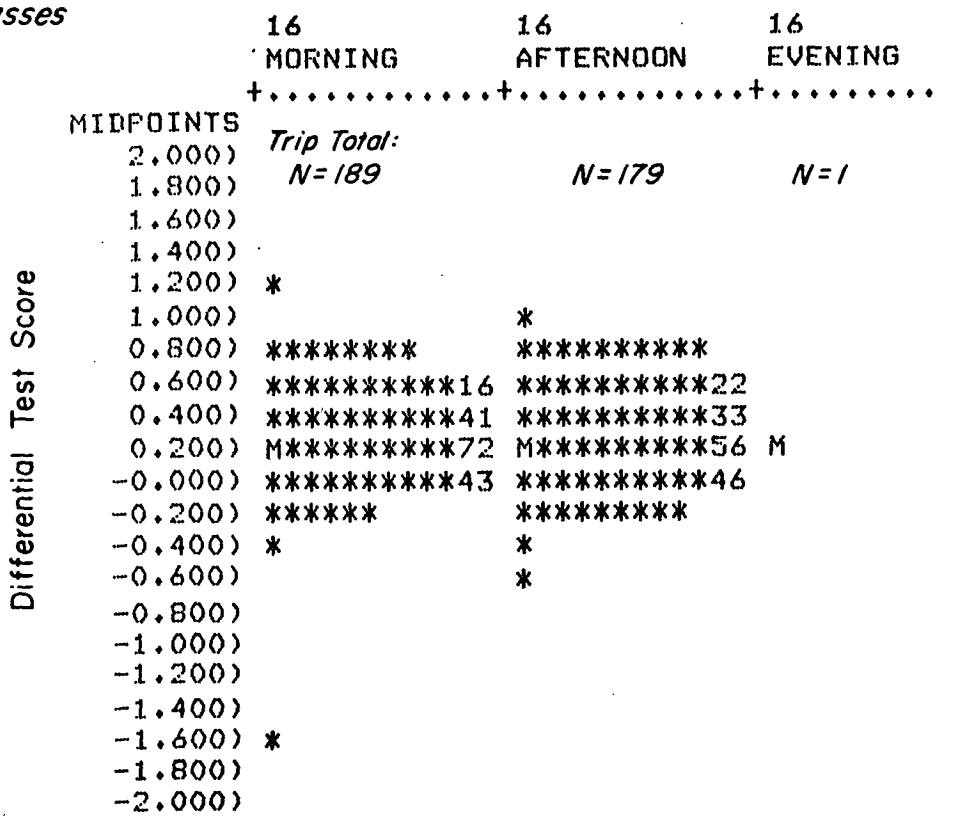


Figure I-41. Biweekly Performance Data for Subject 16

a) Passes



b) Failures

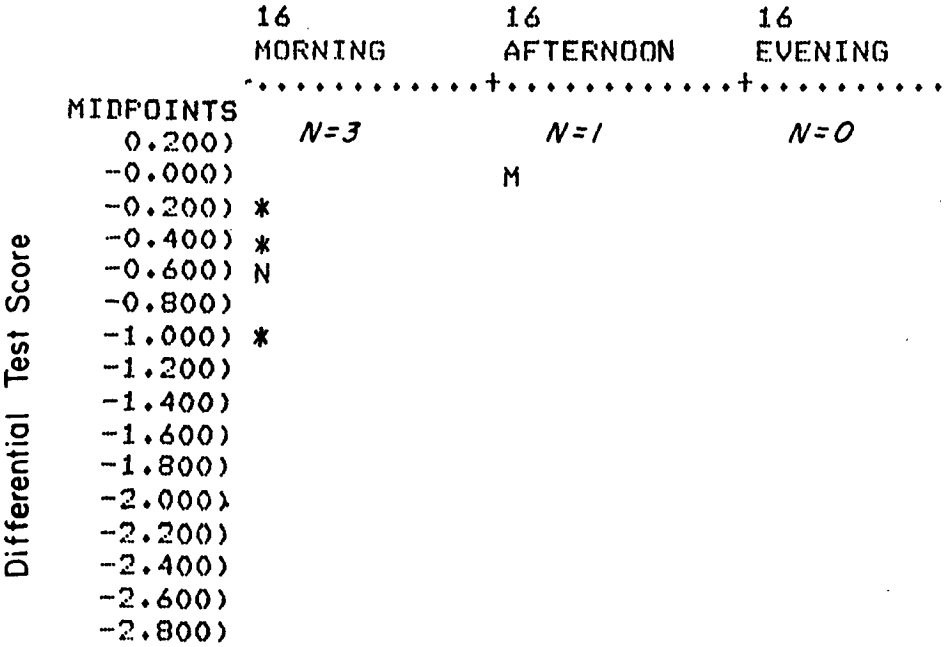


Figure I-42. Differential Test Score Histograms for Subject 16

Subject 17

Subject 17 was 64 years old, a retired janitor for Los Angeles County, who occasionally cut hair at the "old folks home." He lived on a small pension and had a lady friend that relied on him for transportation. This subject appeared to have a serious drinking problem. Deterred drives consistently showed up on the computer generated event report at 11:00 a.m. to 12 noon. Sometimes these attempts at the test were noted in the logbook and sometimes they weren't, presumably due to the BAC level of the subject. On Fridays after he failed, he would drive the car around to the alley to avoid a parking ticket because the street-sweeper would come by. He had no trouble with the test itself and did quite well during the training sessions. We lost four weeks of his driving data due to car problems. (The alternator was not charging the battery enough to power the data logger). This resulted in the pass level being set at the post training level, which was too high, for four weeks. This hurt his confidence in himself and in the system. The car was fixed, his pass score was adjusted and gradually came back up to the correct level as indicated in Fig. I-44.

This subject was a good test of the DDWS system because his experience was very positive in spite of his age, his tremor, his inability to transfer information from short term to long term memory, and his poverty. In his final debriefing interview he stated:

1. He thought the system deterred drunk driving and the program should be continued.

2. He did not change his driving habits, i.e. the DDWS did not inhibit him from going anywhere he wanted.

3. If he had to make the choice over he would select the DDWS again.

Figure I-43 shows a portion of his seventh period trip report. The failure shown was classified as a sober failure; he passed with no trouble 13 minutes later. The report shows that he often passed the test on his 1st trial and usually with a high score. This subject's own vehicle was a 60's vintage Plymouth. He drove 1,085 miles and had

11 deterred impaired drives. His deterred drive rate was high because of a low number of total trips. Figure I-44 shows erratic performance with high variability, probably due to the pass level problems discussed above. The histograms in Fig. I-45 show that Subject 17 did not drive at night. His failures seem to be evenly distributed about the noon hours.

13	7	12.6947			3.6		A-1----		12:41P	MAY	1	82	2	17	7
13	7	12.7042	34	34	4.4	0.8	D 79		12:42P	MAY	1	82	2	17	7
13	7	12.8533	571	537			B 2		12:51P	MAY	1	82	2	17	7
13	7	13.0100			3.6		A-1----		1: 0P	MAY	1	82	2	17	7
13	7	13.0106	2	2			B 2		1: 0P	MAY	1	82	2	17	7
13	7	13.0172			3.6		A-1----		1: 1P	MAY	1	82	2	17	7
13	7	13.0286	41	41	4.5	0.9	D 79		1: 1P	MAY	1	82	2	17	7
13	7	13.1083	328	287			B 2		1: 6P	MAY	1	82	2	17	7
14	2	12.4375			3.6		A-1----		12:26P	MAY	3	82	2	17	7
14	2	12.4456	29	29	4.4	0.8	D 79		12:26P	MAY	3	82	2	17	7
14	2	12.6311	697	668			B 2		12:37P	MAY	3	82	2	17	7
14	2	12.8506			3.6		A-1----		12:51P	MAY	3	82	2	17	7
14	2	12.8611	38	38	4.8	1.2	D 79		12:51P	MAY	3	82	2	17	7
14	2	13.0497	717	679			B 2		1: 2P	MAY	3	82	2	17	7
14	2	13.4061			3.6		A-1----		1:24P	MAY	3	82	2	17	7
14	2	13.4219	57	57	4.5	0.9	D 79		1:25P	MAY	3	82	2	17	7
14	2	13.4539	172	115			B 2		1:27P	MAY	3	82	2	17	7
14	2	13.6833			3.6		A-1----		1:41P	MAY	3	82	2	17	7
14	2	13.6886	19	19	3.3	-0.3	D 49		1:41P	MAY	3	82	2	17	7
14	2	13.6978	52	33	4.6	1.0	D 79		1:41P	MAY	3	82	2	17	7
14	2	13.8672	662	610			B 2		1:52P	MAY	3	82	2	17	7
14	6	9.5953			3.6		A-1----		9:35	MAY	7	82	2	17	7
14	6	9.6072	43	43	3.4	-0.2	D 49		9:36	MAY	7	82	2	17	7
14	6	9.6186	84	41	4.9	1.3	D 79		9:37	MAY	7	82	2	17	7
14	6	9.6453	180	96			B 2		9:38	MAY	7	82	2	17	7
14	6	14.3633			3.6		A-1----		2:21P	MAY	7	82	2	17	7
14	6	14.3717	30	30	4.0	0.4	D 79		2:22P	MAY	7	82	2	17	7
14	6	14.6211	928	898			B 2		2:37P	MAY	7	82	2	17	7
14	6	15.0531			3.6		A-1----		3: 3P	MAY	7	82	2	17	7
14	6	15.0619	32	32	3.0	-0.6	D 49	nervous	3: 3P	MAY	7	82	2	17	7
14	6	15.0683	55	23	3.4	-0.2	D 49		3: 4P	MAY	7	82	2	17	7
14	6	15.0722	69	14	1.5	-2.1	D 49	moved car	3: 4P	MAY	7	82	2	17	7
14	6	15.0889	129	60	3.5	-0.1	D 49	because of	3: 5P	MAY	7	82	2	17	7
14	6	15.1128	215	86			E	⑤	3: 6P	MAY	7	82	2	17	7
14	6	15.2886	848	633			B 2	street	3:17P	MAY	7	82	2	17	7
14	6	15.3017			3.6		A-1----	sweeper	3:18P	MAY	7	82	2	17	7
14	6	15.3131	41	41	4.0	0.4	D 79		3:18P	MAY	7	82	2	17	7
14	6	15.4775	633	592			B 2		3:28P	MAY	7	82	2	17	7
15	1	12.0119			3.6		A-1----		12: 0P	MAY	9	82	2	17	7
15	1	12.0194	27	27	4.7	1.1	D 79		12: 1P	MAY	9	82	2	17	7
15	1	12.1336	438	411			B 2		12: 8P	MAY	9	82	2	17	7
15	1	12.2164			3.6		A-1----		12:12P	MAY	9	82	2	17	7
15	1	12.2275	40	40	5.2	1.6	D 79		12:13P	MAY	9	82	2	17	7
15	1	12.6075	1408	1368			B 2		12:36P	MAY	9	82	2	17	7
15	1	13.3433			3.6		A-1----		1:20P	MAY	9	82	2	17	7
15	1	13.3503	25	25	4.8	1.2	D 79		1:21P	MAY	9	82	2	17	7
15	1	13.4228	286	261			B 2		1:25P	MAY	9	82	2	17	7
15	1	13.4472			3.6		A-1----		1:26P	MAY	9	82	2	17	7
15	1	13.4642	61	61	4.0	0.4	D 79		1:27P	MAY	9	82	2	17	7
15	1	13.5058	211	150			B 2		1:30P	MAY	9	82	2	17	7
15	1	13.6753			3.6		A-1----		1:40P	MAY	9	82	2	17	7
15	1	13.6828	27	27	5.2	1.6	D 79		1:40P	MAY	9	82	2	17	7
15	1	13.7394	231	204			B 2		1:44P	MAY	9	82	2	17	7
15	1	13.7961			3.6		A-1----		1:47P	MAY	9	82	2	17	7
15	1	13.8050	32	32	5.4	1.8	D 79		1:48P	MAY	9	82	2	17	7
15	1	13.8864	325	293			B 2		1:53P	MAY	9	82	2	17	7
15	1	14.0014			3.6		A-1----		2: 0P	MAY	9	82	2	17	7
15	1	14.0078	23	23	4.2	0.6	D 79		2: 0P	MAY	9	82	2	17	7
15	1	14.0436	152	129			B 2		2: 2P	MAY	9	82	2	17	7
15	1	14.1150			3.6		A-1----		2: 6P	MAY	9	82	2	17	7
15	1	14.1256	38	38	2.4	-1.2	D 49		2: 7P	MAY	9	82	2	17	7
15	1	14.1342	69	31	3.8	0.2	D 79		2: 8P	MAY	9	82	2	17	7
15	1	14.1833	246	177			B 2		2:11P	MAY	9	82	2	17	7
15	1	14.2922			3.6		A-1----		2:17P	MAY	9	82	2	17	7
15	1	14.2983	22	22	4.3	0.7	D 79		2:17P	MAY	9	82	2	17	7
15	1	14.3842	331	309			B 2		2:23P	MAY	9	82	2	17	7
15	1	18.6217			3.6		A-1----		6:37P	MAY	9	82	2	17	7
15	1	18.6278	22	22	4.1	0.5	D 79		6:37P	MAY	9	82	2	17	7
15	1	19.0880	1679	1657			B 2		7: 5P	MAY	9	82	2	17	7
15	1	19.1989			3.6		A-1----		7:11P	MAY	9	82	2	17	7
15	1	19.2075	31	31	4.1	0.5	D 79		7:12P	MAY	9	82	2	17	7
15	1	19.2339	126	95			B 2		7:14P	MAY	9	82	2	17	7
15	4	10.6828			3.6		A-1----		10:40	MAY	12	82	2	17	7
15	4	10.6903	27	27	3.5	-0.1	D 49		10:41	MAY	12	82	2	17	7
15	4	10.6989	58	31	3.8	0.2	D 79		10:41	MAY	12	82	2	17	7
15	4	10.8558	623	565			B 2		10:51	MAY	12	82	2	17	7
15	4	11.5889			3.6		A-1----		11:35	MAY	12	82	2	17	7
15	4	11.5953	23	23	4.4	0.8	D 79		11:35	MAY	12	82	2	17	7
15	4	11.7403	545	522			B 2		11:44	MAY	12	82	2	17	7
15	4	13.4661			3.6		A-1----		1:27P	MAY	12	82	2	17	7
15	4	13.4744	30	30	3.7	0.1	D 79		1:28P	MAY	12	82	2	17	7
15	4	13.9639	1792	1762			B 2		1:57P	MAY	12	82	2	17	7

Figure I-43. Excerpt from Event Log of Subject 17

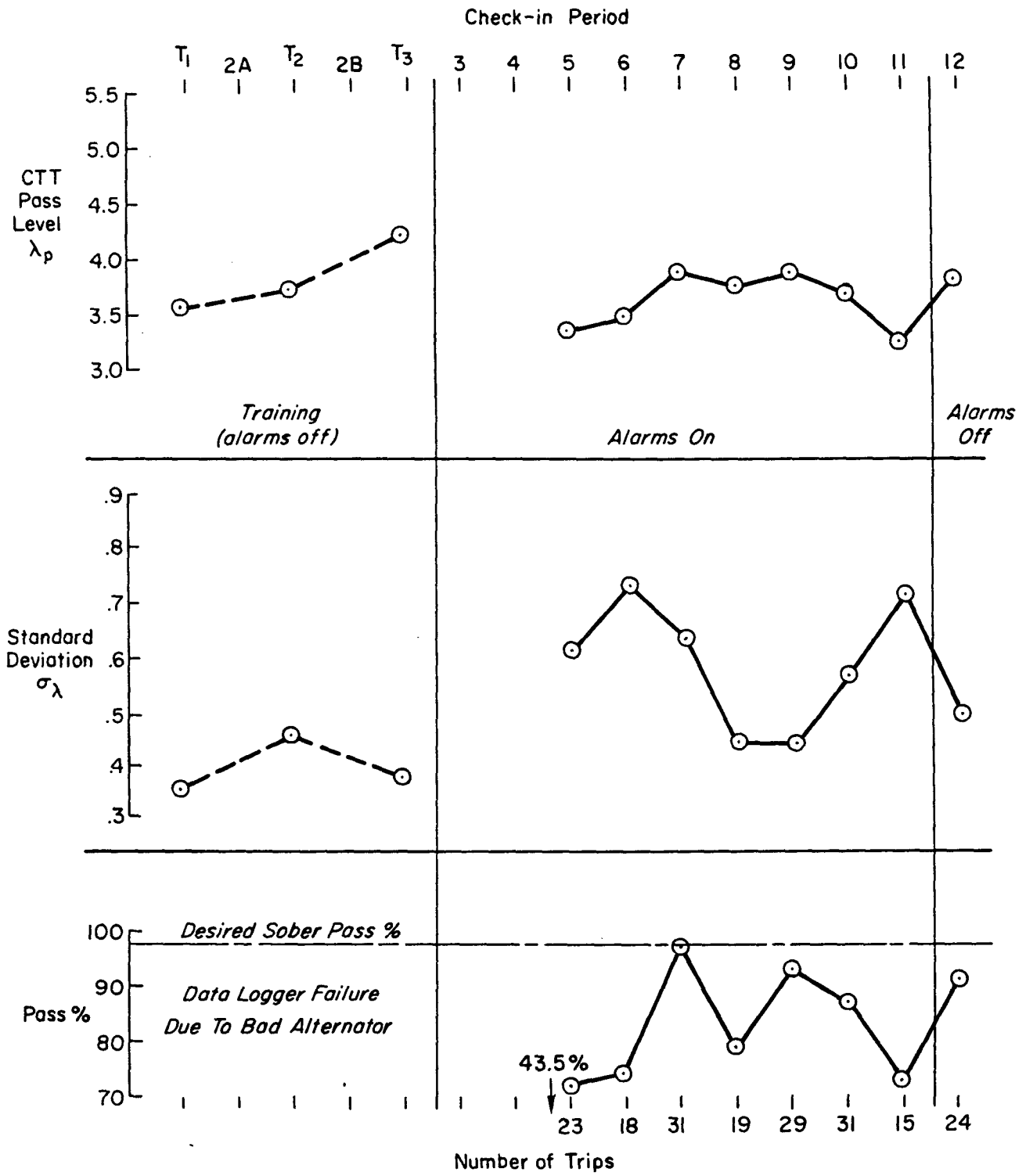
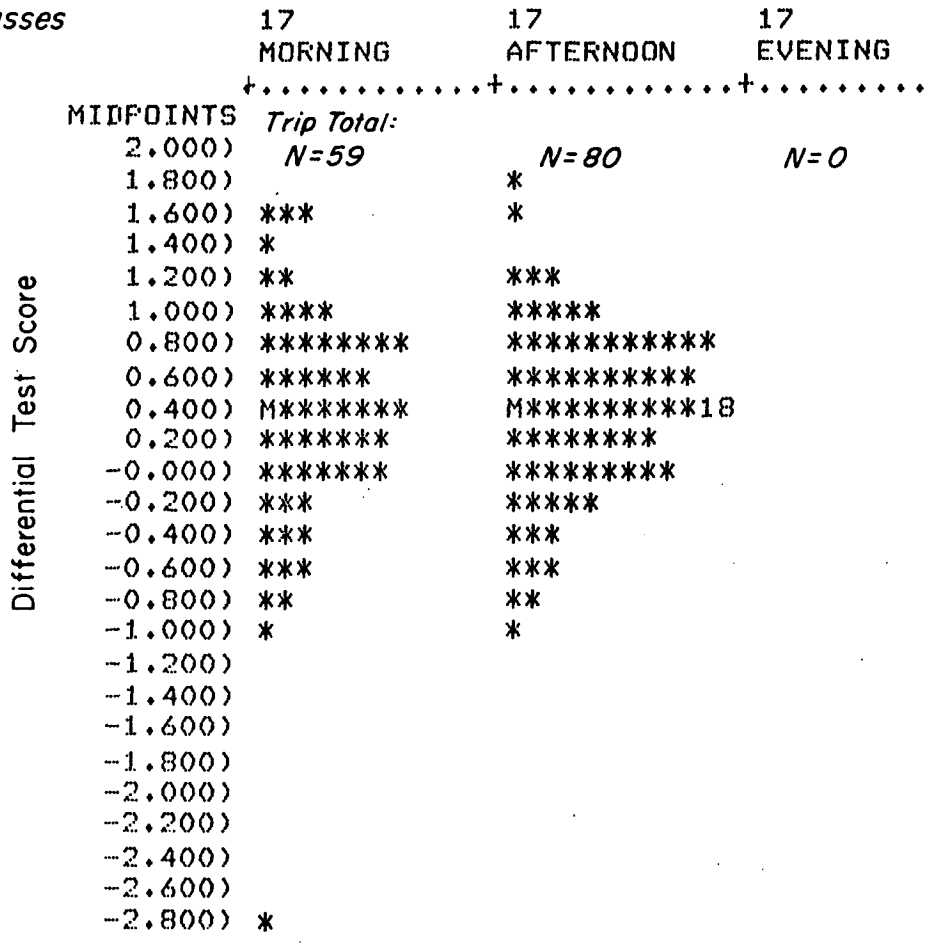


Figure I-44. Biweekly Performance Data for Subject 17

a) Passes



b) Failures

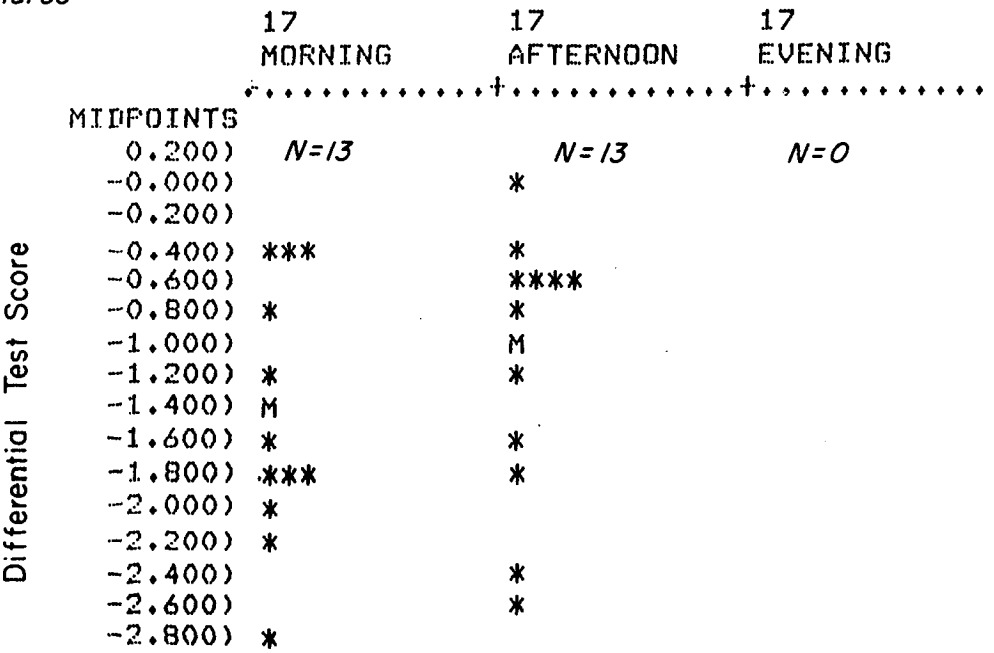


Figure I-45. Differentical Test Score Histograms for Subject 17

Subject 18

Subject 18 was 26 years old, married with children, and had just separated from his wife when he started the program. He was illiterate and unemployed, yet seemed to have no apparent money problems. He took the MMPI by having his sister read each of the 566 items to him. He showed up for his check-ins, usually with some terrible injury from his latest mugging, and always with one or two friends. He was very erratic about logging his trips and did not follow the rules other than those required by the hardware in order for him to be able to drive.

The third check-in showed 38 failures. They were mainly consecutive and represented hours spent in the car (see Fig. I-47). We interpret this to mean that he was either training his friends to pass the test or else they were using the car as a video game. When asked about these failures he replied that he had been tired. There was no doubt the subject himself could pass the test because on April 7 he made 9 trips always passing the test on the first or second try, and by a wide margin. See Fig. I-46.

After two months on the program he was arrested with 22,000 illegal fireworks in the DDWS car. His friends were with him and they were all drinking beer and playing with the test. He had violated his probation in several ways: 1) not following STI rules, 2) drinking in the car, and 3) allowing others to take the test.

Subject No. 18 was dropped from the program after 10 weeks. (See Exhibit I-2 following this narrative.) He had driven 425 miles and it is not clear how many deterred drives he had. This subject was not available for a final debriefing. This subject may be typical of those not suited for the DDWS sanction (i.e., not socially responsible).

EXHIBIT I-2

SYSTEMS TECHNOLOGY, INC.

13766 SOUTH HAWTHORNE BOULEVARD • HAWTHORNE, CALIFORNIA 90250-7083 • PHONE (213) 679-2281

In reply refer to:

20 April 1982

The Honorable Hugo Hill
Compton Municipal Court
Division 2
200 West Compton Blvd.
Compton, CA

Dear Judge Hill:

Enclosed is the arrest report on defendant Subject 18.

We are of the opinion that Mr. 18 has violated his probation in the following ways:

1. "Vehicle saturated in alcoholic beverage" violates condition #9, "Defendant is not to commit the same or similar offenses."

2. Storage of over 22,000 illegal firecrackers and bottle rockets violates the intent of condition #4, "Obey all rules and conditions of STI in conjunction with the research project"; as STI rule #5 states "You are not to tamper with, play with, attempt to disable or remove, or disconnect any portion of the Drunk Driver Warning System."

3. It also appears that Mr. 18 has an additional violation of condition #4. His data indicates that he was either training a friend to pass the test, or allowing the neighborhood to use the system as a "video game." This is also a violation of STI rules.

Thank you for your help in this matter.

Very truly yours,

SYSTEMS TECHNOLOGY, INC.

A. C. Stein
Staff Engineer, Psychologist

ACS/lh

```
7 3 20.9022                4.3          A-1----
7 3 20.9103    29   29         4.0 -0.3 D   49
7 3 20.9228    74   45         4.1 -0.2 D    4
7 3 20.9300   100   26         4.6  0.3 D    7
7 3 21.2447  1233 1133                   B  2
7 4  7.9661                4.3          A-1----
7 4  7.9742    29   29         4.4  0.1 D   79
7 4  8.0689   370  341                   B  2
7 4  8.1275                4.3          A-1----
7 4  8.1339    23   23         4.3  0.0 D    4
7 4  8.1450    63   40         4.2 -0.1 D   49
7 4  8.1514    86   23         3.7 -0.6 D    4
7 4  8.1647   134   48         4.4  0.1 D   79
7 4  8.9831  3080 2946                   B  2
7 4  9.1881                4.3          A-1----
7 4  9.1969    32   32         4.4  0.1 D    7
7 4  9.9042  2578 2546                   B  2
7 4 10.3844                4.3          A-1----
7 4 10.3914    25   25         4.9  0.6 D   79
7 4 10.7917  1466 1441                   B  2
7 4 11.7408                4.3          A-1----
7 4 11.7539    47   47         4.2 -0.1 D    4
7 4 11.7625    78   31         4.8  0.5 D    7
7 4 11.9856   881  803                   B  2
7 4 12.4236                4.3          A-1----
7 4 12.4350    41   41         4.5  0.2 D   79
7 4 12.5908   602  561                   B  2
7 4 13.7858                4.3          A-1----
7 4 13.7942    30   30         5.2  0.9 D   79
7 4 14.1439  1289 1259                   B  2
7 4 14.1636                4.3          A-1----
7 4 14.1708    26   26         4.8  0.5 D    7
7 4 14.2703   384  358                   B  2
7 4 15.2839                4.3          A-1----
7 4 15.2992    55   55         4.4  0.1 D   79
7 4 15.4122   462  407                   B  2
7 4 15.4514                4.3          A-1----
7 4 15.4614    36   36         5.0  0.7 D   79
7 4 15.5797   462  426                   B  2
7 4 16.6097                4.3          A-1----
7 4 16.6189    33   33         4.5  0.2 D   79
7 4 17.6700  3817 3784                   B  2
7 4 18.6575                4.3          A-1----
7 4 18.6633    21   21         3.4 -0.9 D   49
7 4 18.6733    57   36         3.5 -0.8 D   49
7 4 18.6828    91   34         3.9 -0.4 D   49
7 4 18.6914   122   31         2.9 -1.4 D   49
7 4 18.8650   747  625                   B  2
7 4 19.0683                4.3          A-1----
7 4 19.0814    47   47         3.9 -0.4 D    4
7 4 19.0883    72   25         3.7 -0.6 D    4
7 4 19.0972   104   32         3.6 -0.7 D    4
7 4 19.1053   133   29         4.1 -0.2 D    4
7 4 19.2792   759  626                   B  2
```

```
8:54P APR  6 82 2 18 4
8:54P APR  6 82 2 18 4
8:55P APR  6 82 2 18 4
8:55P APR  6 82 2 18 4
9:14P APR  6 82 2 18 4
7:57  APR  7 82 2 18 4
7:58  APR  7 82 2 18 4
8: 4  APR  7 82 2 18 4
8: 7  APR  7 82 2 18 4
8: 8  APR  7 82 2 18 4
8: 8  APR  7 82 2 18 4
8: 9  APR  7 82 2 18 4
8: 9  APR  7 82 2 18 4
8:58  APR  7 82 2 18 4
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9:11  APR  7 82 2 18 4
9:54  APR  7 82 2 18 4
10:23 APR  7 82 2 18 4
10:23 APR  7 82 2 18 4
10:47 APR  7 82 2 18 4
11:44 APR  7 82 2 18 4
11:45 APR  7 82 2 18 4
11:45 APR  7 82 2 18 4
11:59 APR  7 82 2 18 4
12:25P APR  7 82 2 18 4
12:26P APR  7 82 2 18 4
12:35P APR  7 82 2 18 4
1:47P APR  7 82 2 18 4
1:47P APR  7 82 2 18 4
2: 8P APR  7 82 2 18 4
2: 9P APR  7 82 2 18 4
2:10P APR  7 82 2 18 4
2:16P APR  7 82 2 18 4
3:17P APR  7 82 2 18 4
3:17P APR  7 82 2 18 4
3:24P APR  7 82 2 18 4
3:27P APR  7 82 2 18 4
3:27P APR  7 82 2 18 4
3:34P APR  7 82 2 18 4
4:36P APR  7 82 2 18 4
4:37P APR  7 82 2 18 4
5:40P APR  7 82 2 18 4
6:39P APR  7 82 2 18 4
6:39P APR  7 82 2 18 4
6:40P APR  7 82 2 18 4
6:40P APR  7 82 2 18 4
6:41P APR  7 82 2 18 4
6:51P APR  7 82 2 18 4
7: 4P APR  7 82 2 18 4
7: 4P APR  7 82 2 18 4
7: 5P APR  7 82 2 18 4
7: 5P APR  7 82 2 18 4
7: 6P APR  7 82 2 18 4
7:16P APR  7 82 2 18 4
```

Figure I-46. Excerpt from Event Log of Subject 18 Showing Good Test Performance

```
7 4 21.4617                4.3          A-1----
7 4 21.4703    31   31         2.7 -1.6 D   49
7 4 21.4769    55   24         2.6 -1.7 D   49
7 4 21.4819    73   18         2.2 -2.1 D   49
7 4 21.4886    97   24         2.6 -1.7 D    4
7 4 21.6625   723  626                   B  2
7 4 21.6661                4.3          A-1----
7 4 21.6711    18   18         2.8 -1.5 D    4
7 4 21.6767    38   20         2.1 -2.2 D    4
7 4 21.6822    58   20         2.4 -1.9 D    4
7 4 21.6861    72   14         1.9 -2.4 D   49
7 4 21.8600   698  626                   B  2
7 4 21.8642                4.3          A-1----
7 4 21.8683    15   15         2.1 -2.2 D    4
7 4 21.8755    41   26         3.0 -1.3 D   49
7 4 21.8800    57   16         2.1 -2.2 D   49
7 4 21.8844    73   16         2.2 -2.1 D    4
7 4 22.0580   698  625                   B  2
7 4 22.0608                4.3          A-1----
7 4 22.0658    18   18         2.0 -2.3 D   49
7 4 22.0722    41   23         2.6 -1.7 D   49
7 4 22.0792    66   25         2.4 -1.9 D   49
7 4 22.0811    73    7         1.3 -3.0 D   49
7 4 22.2550   699  626                   B  2
7 4 22.2667                4.3          A-1----
7 4 22.2742    27   27         2.9 -1.4 D   49
7 4 22.2797    47   20         2.8 -1.5 D   49
7 4 22.2894    82   35         3.6 -0.7 D   49
7 4 22.2972   110   28         2.8 -1.5 D   49
7 4 22.4783   762  652         2.8 -1.5 D    4
7 4 22.4864   791   29         1.6 -2.7 D    4
7 4 22.4939   818   27         2.9 -1.4 D    4
7 4 22.4969   829   11         1.7 -2.6 D    4
7 4 22.6708  1455  626                   B  2
7 4 22.6894                4.3          A-1----
7 4 22.6955    22   22         3.4 -0.9 D   49
7 4 22.7103    75   53         3.7 -0.6 D   49
7 4 22.7161    96   21         3.3 -1.0 D   49
7 4 22.7225   119   23         3.1 -1.2 D    4
7 4 22.8964   745  626                   B  2
7 4 22.9408                4.3          A-1----
7 4 22.9478    25   25         3.3 -1.0 D   49
7 4 22.9564    56   31         3.6 -0.7 D    4
7 4 22.9658    90   34         2.9 -1.4 D   49
7 4 22.9744   121   31         2.7 -1.6 D   49
7 4 23.1480   746  625                   B  2
7 4 23.4042                4.3          A-1----
7 4 23.4111    25   25         3.5 -0.8 D    4
7 4 23.4197    56   31         3.4 -0.9 D   49
7 4 23.4261    79   23         3.0 -1.3 D   49
7 4 23.4369   118   39         3.4 -0.9 D    4
7 4 23.6108   744  626                   B  2
7 4 23.6186                4.3          A-1----
7 4 23.6261    27   27         4.4  0.1 D   79
7 5  0.3194  2523 2496                   B  2
7 5 12.5917                4.3          A-1----
7 5 12.6031    41   41                   B  2
7 5 12.7358                4.3          A-1----
7 5 12.7439    29   29         4.7  0.4 D    7
7 5 13.1489  1487 1458                   B  2
7 5 18.5533                4.3          A-1----
7 5 18.5611    28   28         3.6 -0.7 D   49
7 5 18.5747    77   49         4.2 -0.1 D   49
7 5 18.5853   115   38         3.7 -0.6 D   49
7 5 18.6019   175   60         4.0 -0.3 D    4
7 5 18.7755   800  625                   B  2
7 5 21.2661                4.3          A-1----
7 5 21.2758    35   35         2.7 -1.6 D   49
7 5 21.2864    73   38         2.7 -1.6 D   49
7 5 21.2922    94   21         2.1 -2.2 D   49
7 5 21.2969   111   17         2.2 -2.1 D   49
7 5 21.4708   737  626                   B  2
7 6 13.6533                4.3          A-1----
7 6 13.6647    41   41         5.1  0.8 D    7
7 6 14.3083  2358 2317                   B  2
```

```
9:27P APR  7 82 2 18 4
9:28P APR  7 82 2 18 4
9:28P APR  7 82 2 18 4
9:28P APR  7 82 2 18 4
9:29P APR  7 82 2 18 4
9:39P APR  7 82 2 18 4
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9:17P APR  8 82 2 18 4
9:28P APR  8 82 2 18 4
1:39P APR  9 82 2 18 4
1:39P APR  9 82 2 18 4
2:18P APR  9 82 2 18 4
```

Figure I-47. Excerpt that Suggests Untrained Individuals are Taking the Test

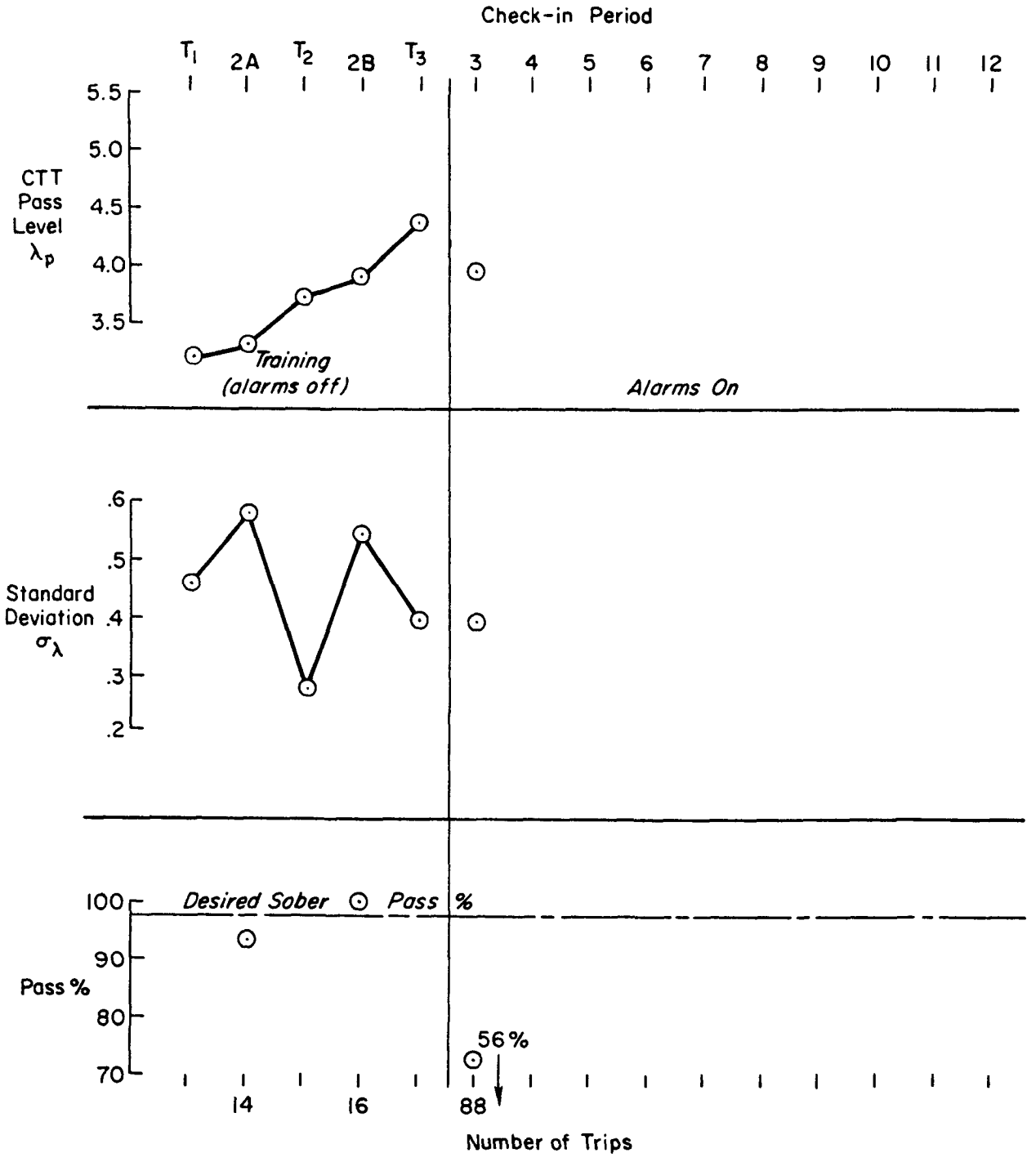


Figure I-48. Biweekly Performance Data for Subject 18

Subject 19

Subject 19 was 33 years old, single, and lived with his parents. When he started the program he was unemployed and broke. He borrowed money from STI to pay for his insurance and gas. One night he got drunk at a party, failed the test and slept in the car. At 7:00 a.m. he drove without passing the test. He was the only subject to actually drive with the alarms on after drinking. He said that he stayed under 10 mph and the horn never actually sounded (see Fig. I-49). He had a probation hearing and was allowed to continue the program. (See accompanying letter to court in Exhibit I-3). After this incident family problems developed. He started to drink heavily and ended up with 130 deterred drives over the ensuing four month period.

At each check-in the pass level is adjusted to reflect 40 percent pass level of all sober trials. Over the weeks this subject's 40 percent level was declining so much that it was concluded we were not seeing sober performance. Because of this we maintained the pass level constant at 4.2 (see Fig. I-50).

His own car was in bad shape so he wanted more time on the program. In his final debriefing he said he thought the car was a deterrent to drunk driving and that he would do it again if he had the choice. He drove 11,270 miles which is more than his normal driving behavior, because he was not used to having reliable transportation. Subject 19 had the highest number of trips and the highest deterred drive rate. The histograms in Fig. I-51 show Subject 19's high driving and failure frequencies. His failure rate was highest in the evening hours.

EXHIBIT I-3

SYSTEMS TECHNOLOGY, INC.

13766 SOUTH HAWTHORNE BOULEVARD • HAWTHORNE, CALIFORNIA 90250-7083 • PHONE (213) 679-2281

In reply refer to:

30 April 1982

The Honorable Hugo Hill
Compton Municipal Court
Division 2
200 West Compton Boulevard
Compton, CA 90220

Dear Judge Hill,

On April 6, 1982, Subject 19 came to STI for his routine bi-weekly appointment for the DDWS research project. After his data tape was processed through the computer, it was clear that he had driven the car without passing the test. Subject 19 initially tried to conceal the fact that he had been drinking by saying that he had lost his log book and that he had been "sick" on those driving occasions. As I continued to ask him specific questions regarding the times and circumstances of the drives, he realized that the data were too complete and the real facts came out. He admitted he had been drinking.

Up to this point, Subject 19's behavior regarding the program has been exemplary. When he began with us, he was unemployed and unable to make the required insurance payment necessary to receive his car. We lent him the money and made repayment an additional term of his probation. Three weeks later he had straightened out his problems with the unemployment office, paid back his loan, and enrolled in a computer training school. Overall it seemed that his whole life was changing in a positive manner.

The driving incidents mentioned took place in the early morning hours of March 28. He and his girlfriend were leaving a party. At 1:50 a.m. he tried the test and failed 4 times. He did not drive, he waited and rested until 4:30 a.m. when he tried the test again. He failed again and did not drive. He went to sleep in the car until 6:45 a.m. He tried the test a third time, failed, and again he waited. At 7:03 a.m. he tried and failed the test for the 4th time. At this point, his girlfriend needed to get home, so he drove for 11 minutes under 10 mph. During this drive the hazard lights were flashing, the horn, however, honks only at speeds over 10 mph. At 12:56 p.m. he made 4 short (4-6 minutes) trips without even attempting the test. Again he did not go over 10 mph. At this time he probably would have been able to pass the test had he tried it. He didn't take the test because he was nervous about the previous test failures.

While Subject 19 did violate one important term of his probation we feel it was a one time slip. He did wait through 4 cycles of the test over a 5 hour period. Driving without passing the test is a violation of probation, however, it seems that at speed less than 10 mph he was not a safety hazard. While the system did not deter an impaired drive it should be credited with taking a potentially hazardous situation and changing it into a fairly benign one. This is the type of data we are interested in on this research project.

In view of Subject 19's overall performance and attitude toward the program, we would like very much to have him complete the project as originally intended.

Very truly yours,

SYSTEMS TECHNOLOGY, INC.

Marcia L. Cook
Research Assistant

MLC/war

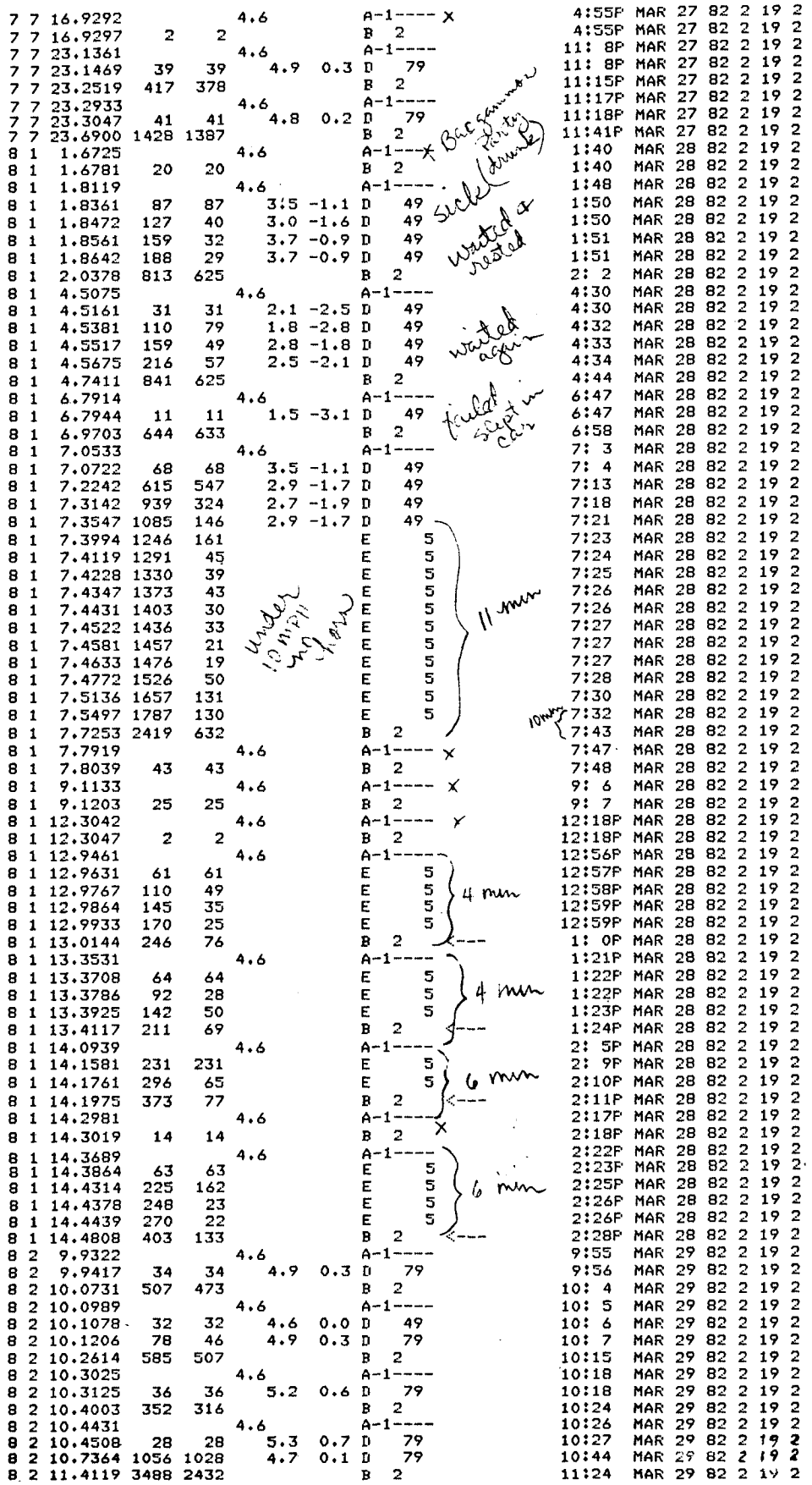


Figure I-49. Excerpt from Event Log of Subject 19 Showing Drives with Alarms On

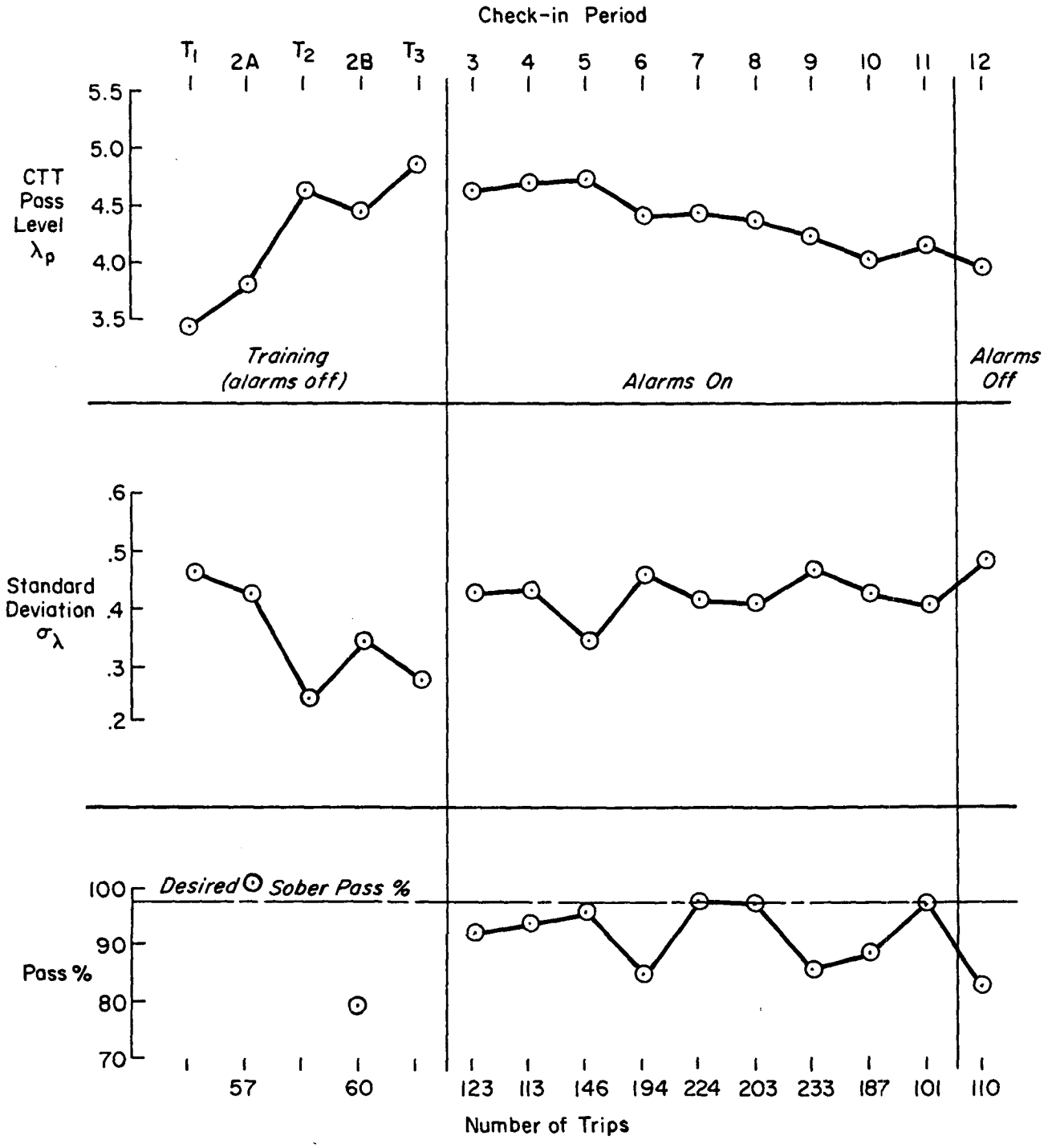
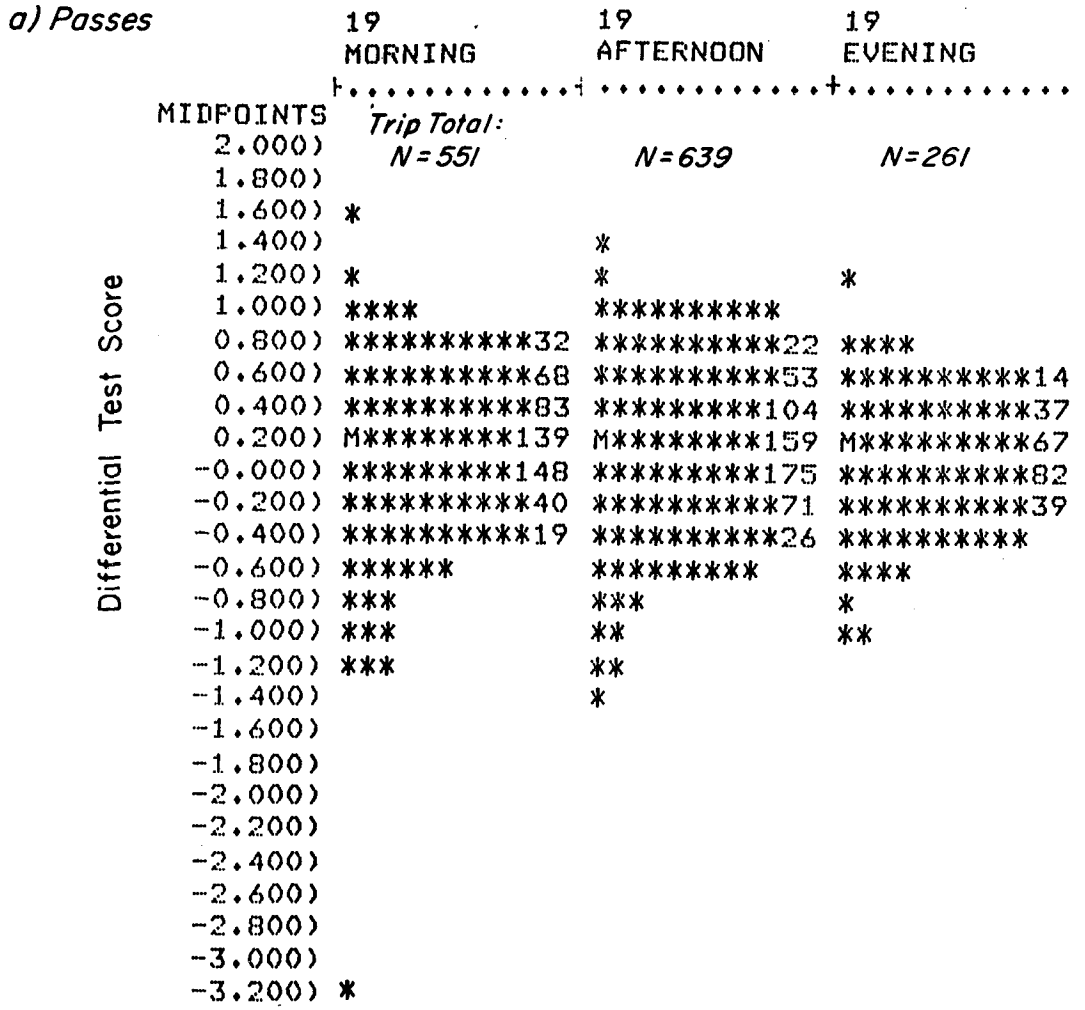


Figure I-50. Biweekly Performance Data for Subject 19

a) Passes



b) Failures

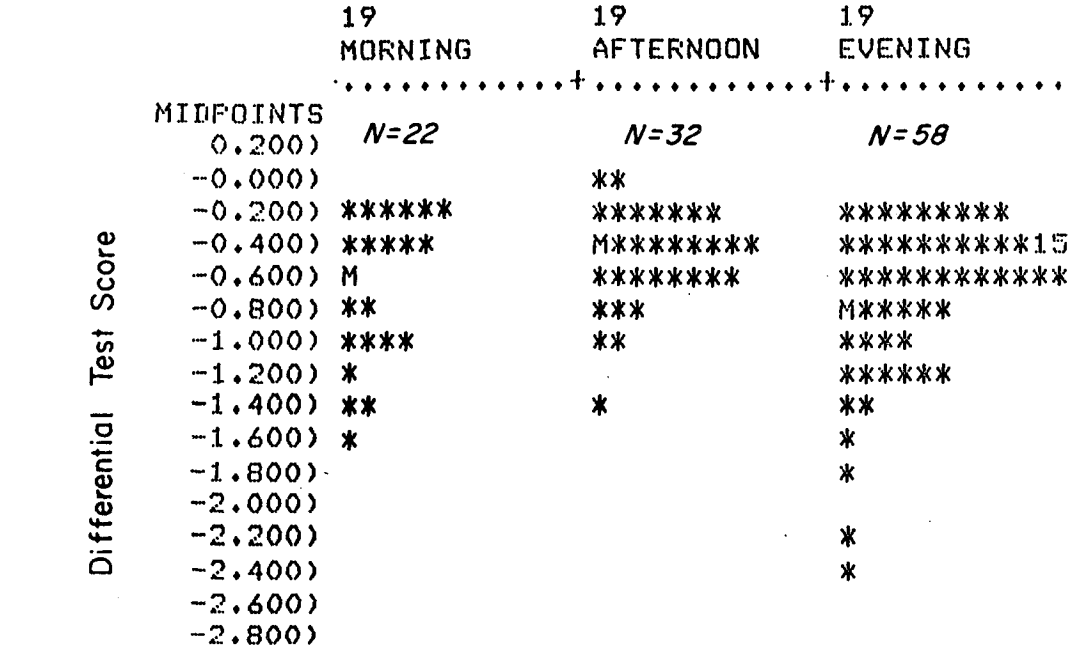


Figure I-51. Differential Test Score Histograms for Subject 19

Subject 20

Subject 20 was 40 years old, married, and had several kids. He worked as a cement layer, and outfitted the car with his work tools. He cut down on his drinking considerably after starting the program. He lost 30 lbs and had one ear pierced and wore a diamond earring. He rarely drove after 7:00 p.m. and got up at 4:30 in the morning to go to work. One day while at work he had to move his car out of the path of a dump truck. He tried the test one time and failed, he drove the car anyway. He was reprimanded for this probation violation, however, he was not sent back to Court because we were certain there was no alcohol involved.

Figue I-52 shows three failures that were classified as sober. He was moving furniture and had been up since 5:30 a.m. -- this was confirmed by the same trip report. Overall miles and number of trips were high and his test failure frequency was below average. His own vehicle was a 1975 Chevrolet van that had been driven over 170,000 miles.

Figure I-53 shows very stable performance with low variability. The histograms in Fig. I-54 show driving in all time periods with few failures.

```
9 / 15.7947                4.4          A-1----          3:47P APR  2 82 2 20 8
9 7 15.8158   76   76      4.5  0.1 D   7                3:48P APR  2 82 2 20 8
9 7 16.1642 1330 1254                 B  2                4: 9P APR  2 82 2 20 8
9 7 16.7222                4.4          A-1----          4:43P APR  2 82 2 20 8
9 7 16.7303   29   29      4.3 -0.1 D   4                4:43P APR  2 82 2 20 8
9 7 16.7403   65   36      4.8  0.4 D   7                4:44P APR  2 82 2 20 8
9 7 16.9244  728  663                 B  2                4:55P APR  2 82 2 20 8
9 7 17.1867                4.4          A-1----          5:11P APR  2 82 2 20 8
9 7 17.1947   29   29      4.7  0.3 D   7                5:11P APR  2 82 2 20 8
9 7 17.3580  617  588                 B  2                5:21P APR  2 82 2 20 8
9 7 19.7094                4.4          A-1----          7:42P APR  2 82 2 20 8
9 7 19.7175   29   29      4.2 -0.2 D   4                7:43P APR  2 82 2 20 8
9 7 19.7267   62   33      4.8  0.4 D   7                7:43P APR  2 82 2 20 8
9 7 19.7592  179  117                 B  2                7:45P APR  2 82 2 20 8
9 7 20.2158                4.4          A-1----          8:12P APR  2 82 2 20 8
9 7 20.2286   46   46      4.0 -0.4 D   4                8:13P APR  2 82 2 20 8
9 7 20.2378   79   33      4.2 -0.2 D   4                8:14P APR  2 82 2 20 8
9 7 20.2472  113   34      4.2 -0.2 D   4                8:14P APR  2 82 2 20 8
9 7 20.2622  167   54      4.4  0.0 D  49                8:15P APR  2 82 2 20 8
9 7 20.4361  793  626                 B  2                8:26P APR  2 82 2 20 8
9 7 20.4564                4.4          A-1----          8:27P APR  2 82 2 20 8
9 7 20.4686   44   44      4.4  0.0 D   4                8:28P APR  2 82 2 20 8
9 7 20.4778   77   33      4.9  0.5 D   7                8:28P APR  2 82 2 20 8
9 7 20.6275  616  539                 B  2                8:37P APR  2 82 2 20 8
9 7 20.6730                4.4          A-1----          8:40P APR  2 82 2 20 8
9 7 20.6792   22   22      4.3 -0.1 D  49                8:40P APR  2 82 2 20 8
9 7 20.6886   56   34      4.7  0.3 D  79                8:41P APR  2 82 2 20 8
9 7 21.7383 3835 3779                 B  2                9:44P APR  2 82 2 20 8
9 7 22.0331                4.4          A-1----         10: 1P APR  2 82 2 20 8
9 7 22.0394   23   23      3.8 -0.6 D  49                10: 2P APR  2 82 2 20 8
9 7 22.0494   59   36      4.4  0.0 D  49                10: 2P APR  2 82 2 20 8
9 7 22.0633  109   50      3.6 -0.8 D  49                10: 3P APR  2 82 2 20 8
9 7 22.0736  146   37      4.4  0.0 D  49                10: 4P APR  2 82 2 20 8
9 7 22.2472  771  625                 B  2               10:14P APR  2 82 2 20 8
9 7 22.2847                4.4          A-1----         10:17P APR  2 82 2 20 8
9 7 22.2975   46   46      4.2 -0.2 D  49                10:17P APR  2 82 2 20 8
9 7 22.3075   82   36      4.4  0.0 D  49                10:18P APR  2 82 2 20 8
9 7 22.3247  144   62      4.6  0.2 D  79                10:19P APR  2 82 2 20 8
9 7 23.0242 2662 2518                 E                  11: 1P APR  2 82 2 20 8
9 7 23.0294 2681   19                 B  2               11: 1P APR  2 82 2 20 8
9 7 23.0467                4.4          A-1----         11: 2P APR  2 82 2 20 8
9 7 23.0555   32   32      4.4  0.0 D  49                11: 3P APR  2 82 2 20 8
9 7 23.0650   66   34      4.9  0.5 D  79                11: 3P APR  2 82 2 20 8
9 7 23.2150  606  540                 B  2               11:12P APR  2 82 2 20 8
9 7 23.7305                4.4          A-1----         11:43P APR  2 82 2 20 8
9 7 23.7400   34   34      4.3 -0.1 D  49                11:44P APR  2 82 2 20 8
9 7 23.7483   64   30      4.5  0.1 D  79                11:44P APR  2 82 2 20 8
9 7 23.8425  403  339                 B  2               11:50P APR  2 82 2 20 8
9 7 23.8778                4.4          A-1----         11:52P APR  2 82 2 20 8
9 7 23.8830   19   19                 B  2               11:52P APR  2 82 2 20 8
10 1  1.2139               4.4          A-1----          1:12  APR  3 82 2 20 8
10 1  1.2247   39   39      4.0 -0.4 D  49                1:13  APR  3 82 2 20 8
10 1  1.2331   69   30      4.4  0.0 D  49                1:13  APR  3 82 2 20 8
10 1  1.2433  106   37      4.2 -0.2 D  49                1:14  APR  3 82 2 20 8
10 1  1.2586  161   55      4.8  0.4 D  79                1:15  APR  3 82 2 20 8
10 1  2.4528 4460 4299                 B  2               2:27  APR  3 82 2 20 8
10 1  4.4144               4.4          A-1----          4:24  APR  3 82 2 20 8
10 1  4.4264   43   43      4.2 -0.2 D   4                4:25  APR  3 82 2 20 8
10 1  4.4358   77   34      4.7  0.3 D  79                4:26  APR  3 82 2 20 8
10 1  4.4603  165   88                 B  2               4:27  APR  3 82 2 20 8
10 1  4.5175               4.4          A-1----          4:31  APR  3 82 2 20 8
10 1  4.5253   28   28      4.9  0.5 D   7                4:31  APR  3 82 2 20 8
10 1  4.5492  114   86                 B  2               4:32  APR  3 82 2 20 8
```

Figure I-52. Excerpt from Subject 20 Event Log

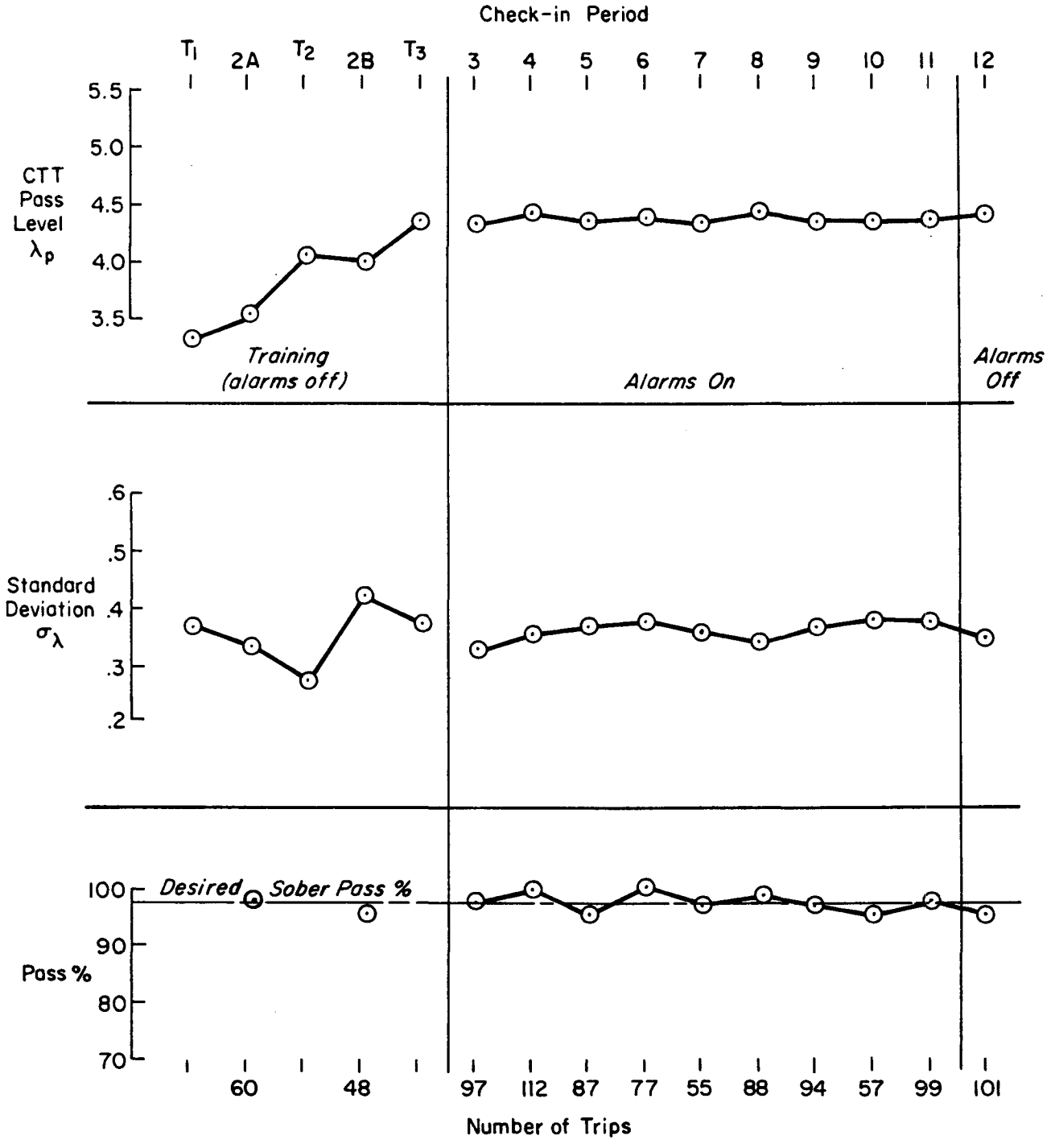
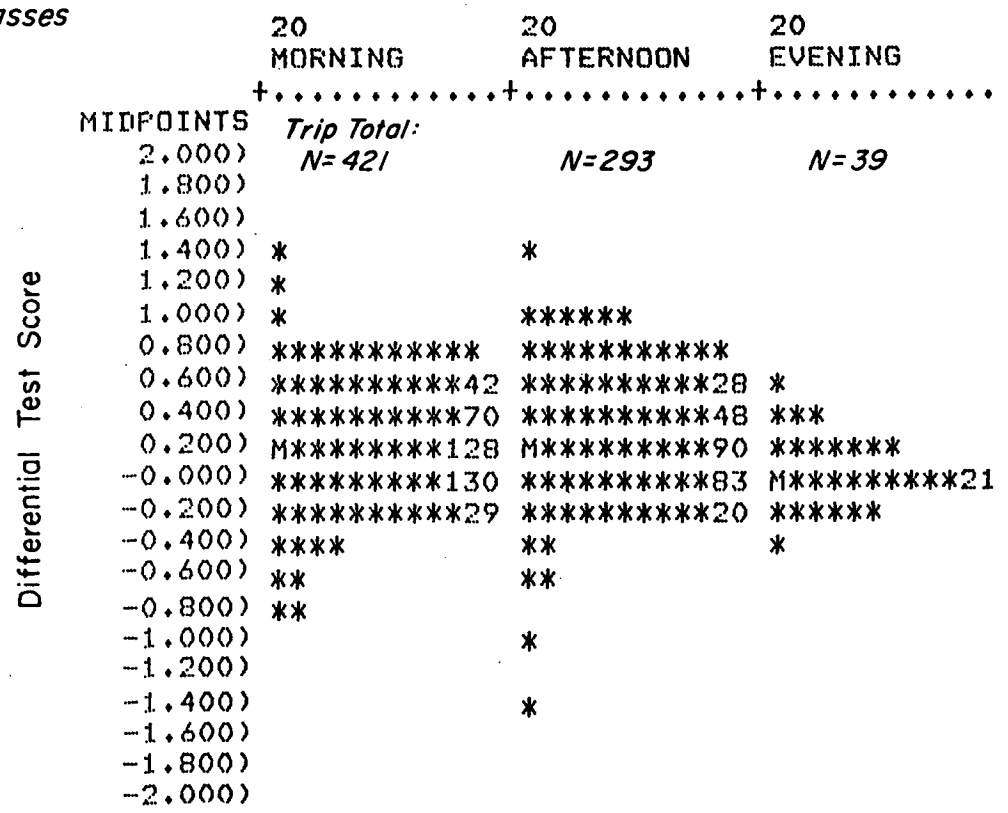


Figure I-53. Biweekly Performance Data for Subject 20

a) Passes



b) Failures

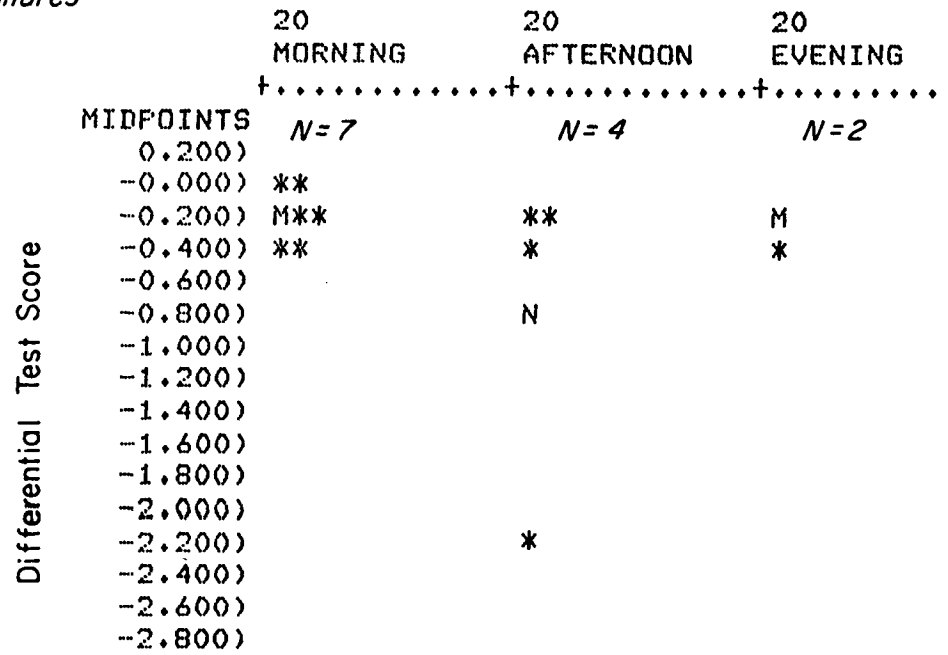


Figure I-54. Differential Test Score Histograms for Subject 20

Subject 21

Subject 21 was 40 years old and managed an auto parts store. He did not have a car of his own. It was totalled in an accident that resulted in his second DWI arrest. While he was on our program a third arrest for driving under the influence came to our attention. It was not a new arrest -- he had failed to appear on the case, and was not rearrested until after the conviction placing him in this program. At this point he was dropped from the DDWS program because he no longer met the eligibility criteria (see Exhibit I-4 following this narrative).

During his participation, Subject 21 did not follow any of the rules of the program and refused to follow-up on details. He showed the car to everyone and allowed everyone to try the test. This accounts for the low pass scores during training (Fig. I-56). Some of the trials were taken by his friends which lowered the score and raised the variability. Subject 21's girlfriend was a bartender and he stayed at her bar every night until about 2:00 a.m. when he would usually try the test and fail. He then "had" to move the car because of a no parking zone and would walk home. Figure I-55 shows him leaving his car 3 out of 4 nights and walking home. He wrote "left it" in his log book when this happened. After awhile he shortened this to L.I. During his two months on the program he had 41 deterred drives.

EXHIBIT I-4

SYSTEMS TECHNOLOGY, INC.

13766 SOUTH HAWTHORNE BOULEVARD • HAWTHORNE, CALIFORNIA 90250-7083 • PHONE (213) 679-2281

In reply refer to:

27 May 1982

To: The Honorable Xenophon Lang
Division 1
Compton Municipal Court
200 West Compton Boulevard
Compton, California 90220

Dear Judge Lang,

On January 26, 1982, Subject 21 was convicted of violating Section 23102(a) of the California Vehicle Code. As his probation he was assigned to participate in the Drunk Driving Warning System research project. It has come to our attention that Subject 21 has three arrests for drunk driving rather than two as stipulated in the Assembly Bill 3482.

This information came just as we were debating whether or not to allow Mr. 21 to continue in the program. We found him to be most uncooperative. His attitude in general was very casual. He missed several appointments without so much as a phone call and he was always late for those appointments that he kept. When he was instructed to get documents from court or follow up on car insurance matters he would agree and then not do it. He was very nice about it, but he just would not do it if it caused him any inconvenience.

While it was a technicality that disqualified Subject 21, he probably would have been dropped from the program in any event.

Because he has not successfully completed the program it seems he will need to be re-sentenced on the original charge. For this reason we are making you aware of all the facts surrounding Subject 21's behavior regarding his probation.

Very truly yours,

SYSTEMS TECHNOLOGY, INC.

Marcia L. Cook
Research Assistant

MLC/war

6	5	19.6708			4.3			A-1----				7:40P	APR	22	82	2	2111		
6	5	19.6808	36	36	4.7	0.4	D	79				7:40P	APR	22	82	2	2111		
6	5	19.7475	276	240			B	2				7:44P	APR	22	82	2	2111		
6	5	21.0356			4.3			A-1----				9: 2P	APR	22	82	2	2111		
6	5	21.0442	31	31	4.1	-0.2	D	4				9: 2P	APR	22	82	2	2111		
6	5	21.0522	60	29	3.9	-0.4	D	4				9: 3P	APR	22	82	2	2111		
6	5	21.0597	87	27	4.1	-0.2	D	4				9: 3P	APR	22	82	2	2111		
6	5	21.0694	122	35	4.3	0.0	D	4				9: 4P	APR	22	82	2	2111		
6	5	21.2430	747	625			B	2				9:14P	APR	22	82	2	2111		
6	6	10.8142			4.3			A-1----				10:48	APR	23	82	2	2111		
6	6	10.8233	33	33	4.9	0.6	D	7				10:49	APR	23	82	2	2111		
6	6	11.1289	1133	1100			B	2				11: 7	APR	23	82	2	2111		
6	6	11.2500			4.3			A-1----				11:15	APR	23	82	2	2111		
6	6	11.2611	40	40	4.9	0.6	D	79				11:15	APR	23	82	2	2111		
6	6	11.3278	280	240			B	2				11:19	APR	23	82	2	2111		
6	6	11.8931			4.3			A-1----				11:53	APR	23	82	2	2111		
6	6	11.9042	40	40	5.2	0.9	D	79				11:54	APR	23	82	2	2111		
6	6	12.1650	979	939			B	2				12: 9P	APR	23	82	2	2111		
6	6	12.5789			4.3			A-1----				12:34P	APR	23	82	2	2111		
6	6	12.5900	40	40	5.2	0.9	D	79				12:35P	APR	23	82	2	2111		
6	6	12.6528	266	226			B	2				12:39P	APR	23	82	2	2111		
6	6	14.2753			4.3			A-1----				2:16P	APR	23	82	2	2111		
6	6	14.2903	54	54	4.7	0.4	D	79				2:17P	APR	23	82	2	2111		
6	6	14.3419	240	186			B	2				2:20P	APR	23	82	2	2111		
6	6	14.9317			4.3			A-1----				2:55P	APR	23	82	2	2111		
6	6	14.9456	50	50	4.9	0.6	D	7				2:56P	APR	23	82	2	2111		
6	6	15.0900	570	520			B	2				3: 5P	APR	23	82	2	2111		
6	6	16.5958			4.3			A-1----				4:35P	APR	23	82	2	2111		
6	6	16.6078	43	43	4.5	0.2	D	7				4:36P	APR	23	82	2	2111		
6	6	16.7003	376	333			B	2				4:42P	APR	23	82	2	2111		
6	6	17.6136			4.3			A-1----				5:36P	APR	23	82	2	2111		
6	6	17.6219	30	30	4.7	0.4	D	79				5:37P	APR	23	82	2	2111		
6	6	17.7056	331	301			B	2				5:42P	APR	23	82	2	2111		
6	6	23.8189			4.3			A-1----				11:49P	APR	23	82	2	2111		
6	6	23.8253	23	23	3.8	-0.5	D	4				11:49P	APR	23	82	2	2111		
6	6	23.8347	57	34	3.6	-0.7	D	49				11:50P	APR	23	82	2	2111		
6	6	23.8392	73	16	2.8	-1.5	D	49				11:50P	APR	23	82	2	2111		
6	6	23.8500	112	39	3.6	-0.7	D	49				11:51P	APR	23	82	2	2111		
6	7	0.0233	736	624			B	2				12: 1	APR	24	82	2	2111		
6	7	8.8911			4.3			A-1----				8:53	APR	24	82	2	2111		
6	7	8.9056	52	52	4.7	0.4	D	79				8:54	APR	24	82	2	2111		
6	7	8.9903	357	305			B	2				8:59	APR	24	82	2	2111		
6	7	17.9872			4.3			A-1----				5:59P	APR	24	82	2	2111		
6	7	17.9955	30	30	4.1	-0.2	D	49				5:59P	APR	24	82	2	2111		
6	7	18.0039	60	30	5.1	0.8	D	79				6: 0P	APR	24	82	2	2111		
6	7	18.1889	726	666			B	2				6:11P	APR	24	82	2	2111		
6	7	22.8680			4.3			A-1----				10:52P	APR	24	82	2	2111		
6	7	22.8761	29	29	3.3	-1.0	D	4				10:52P	APR	24	82	2	2111		
6	7	22.8875	70	41	3.5	-0.8	D	4				10:53P	APR	24	82	2	2111		
6	7	22.8969	104	34	3.0	-1.3	D	4				10:53P	APR	24	82	2	2111		
6	7	22.9058	136	32	3.5	-0.8	D	4				10:54P	APR	24	82	2	2111		
6	7	23.0803	764	628			B	2				11: 4P	APR	24	82	2	2111		
7	1	7.4792			4.3			A-1----				7:28	APR	25	82	2	2111		
7	1	7.4872	29	29	4.4	0.1	D	7				7:29	APR	25	82	2	2111		
7	1	7.6581	644	615			B	2				7:39	APR	25	82	2	2111		
7	1	14.2114			4.3			A-1----				2:12P	APR	25	82	2	2111		
7	1	14.2206	33	33	4.1	-0.2	D	4				2:13P	APR	25	82	2	2111		
7	1	14.3706	573	540			B	2				2:22P	APR	25	82	2	2111		
7	2	8.3900			4.3			A-1----				8:23	APR	26	82	2	2111		
7	2	8.4000	36	36	4.6	0.3	D	7				8:24	APR	26	82	2	2111		
7	2	8.4808	327	291			B	2				8:28	APR	26	82	2	2111		
7	2	16.5169			4.3			A-1----				4:31P	APR	26	82	2	2111		
7	2	16.5247	28	28	4.6	0.3	D	79				4:31P	APR	26	82	2	2111		
7	2	16.6817	593	565			B	2				4:40P	APR	26	82	2	2111		
7	2	23.7225			4.3			A-1----				11:43P	APR	26	82	2	2111		
7	2	23.7308	30	30	4.0	-0.3	D	4				11:43P	APR	26	82	2	2111		
7	2	23.7389	59	29	3.5	-0.8	D	4				11:44P	APR	26	82	2	2111		
7	2	23.7469	88	29	3.8	-0.5	D	4				11:44P	APR	26	82	2	2111		
7	2	23.7553	118	30	3.5	-0.8	D	4				11:45P	APR	26	82	2	2111		
7	2	23.9292	744	626			B	2				11:55P	APR	26	82	2	2111		
7	3	7.5528			4.3			A-1----				7:33	APR	27	82	2	2111		
7	3	7.5653	45	45	5.0	0.7	D	79				7:33	APR	27	82	2	2111		
7	3	7.6531	361	316			B	2				7:39	APR	27	82	2	2111		
7	3	7.7000			4.3			A-1----				7:42	APR	27	82	2	2111		
7	3	7.7056	20	20	3.9	-0.4	D	49				7:42	APR	27	82	2	2111		
7	3	7.7244	88	68	4.1	-0.2	D	49				7:43	APR	27	82	2	2111		
7	3	7.7431	155	67	4.6	0.3	D	7				7:44	APR	27	82	2	2111		
7	3	7.8808	651	496			B	2				7:52	APR	27					
7	3	10																	

walked home

walked home

changed his mind

walked home

Figure I-55. Excerpt from Subject 21 Event Log

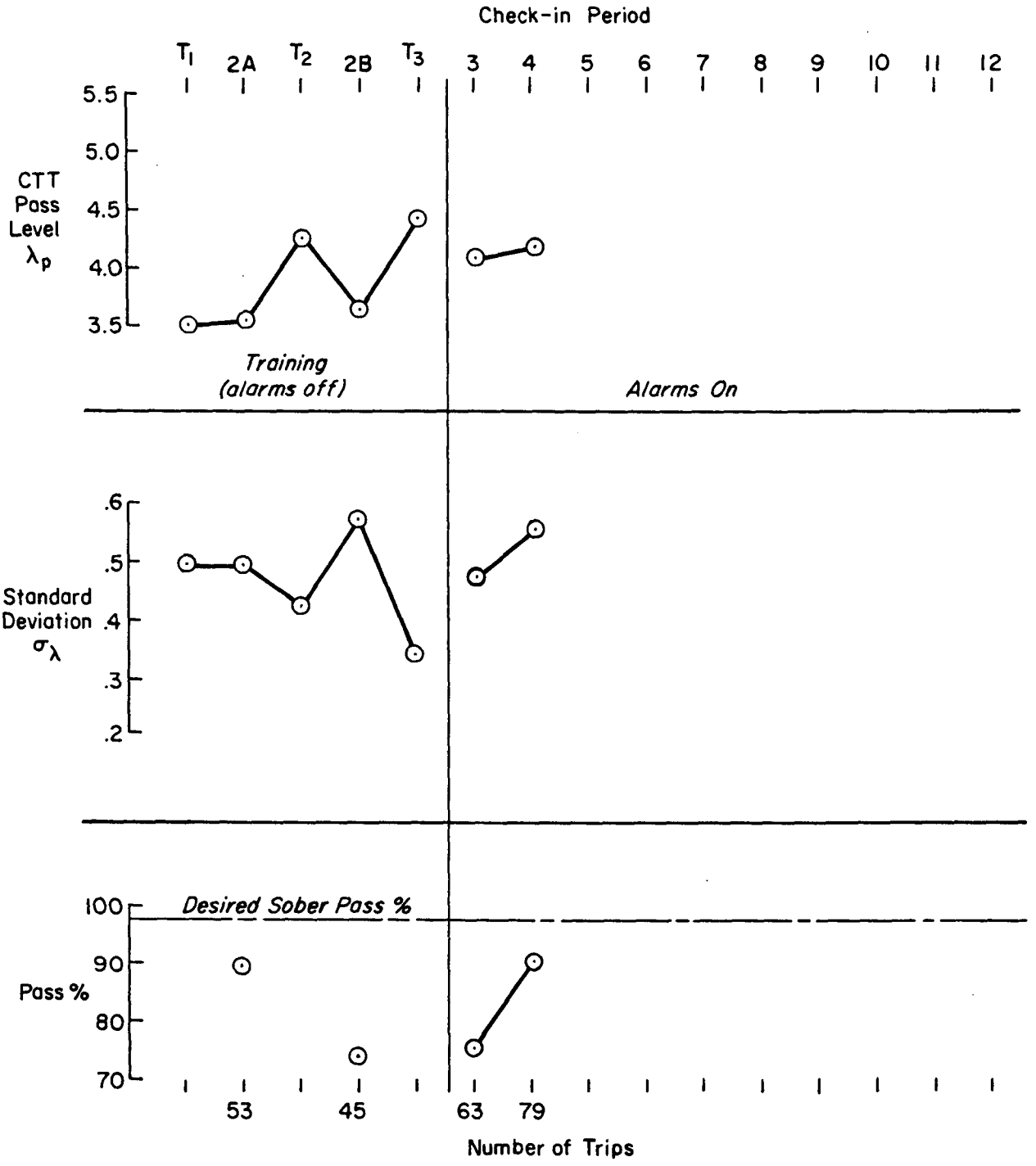


Figure I-56. Biweekly Performance Data for Subject 21

Subject 22

Subject 22 was 47 years old and unemployed. For the first weeks of the program he was very intimidated and was afraid he would make a mistake. He also thought the mileage fee was greater than it was. When it was explained that the mileage fee was only 0.8 cents a mile, he began to drive more. He was also encouraged to try the test even if he wasn't planning on driving to desensitize him to the car and the test. He did this and eventually relaxed with regard to the whole program. He nonetheless drove very little during his six months. The few days that he did work, his son drove. He tested a few times after drinking to see if he could pass the test (he couldn't). After he relaxed about the program he never had any trouble.

On biweekly check-ins Subject 22 would have as few as 12 trials on the CTT. This indicates that there may not be a problem as far as minimum usage rate to maintain proficient CTT performance. In fact, the data in Fig. I-57 shows a learning trend. He drove 1,318 miles and had 9 test failures. He had the lowest number of trips but the 2nd highest deterred drive rate even though his failure frequency was low (Fig. I-58). His own car was a 1972 Cadillac. His DDWS car was damaged by a hit and run driver. He was very enthusiastic about the program.

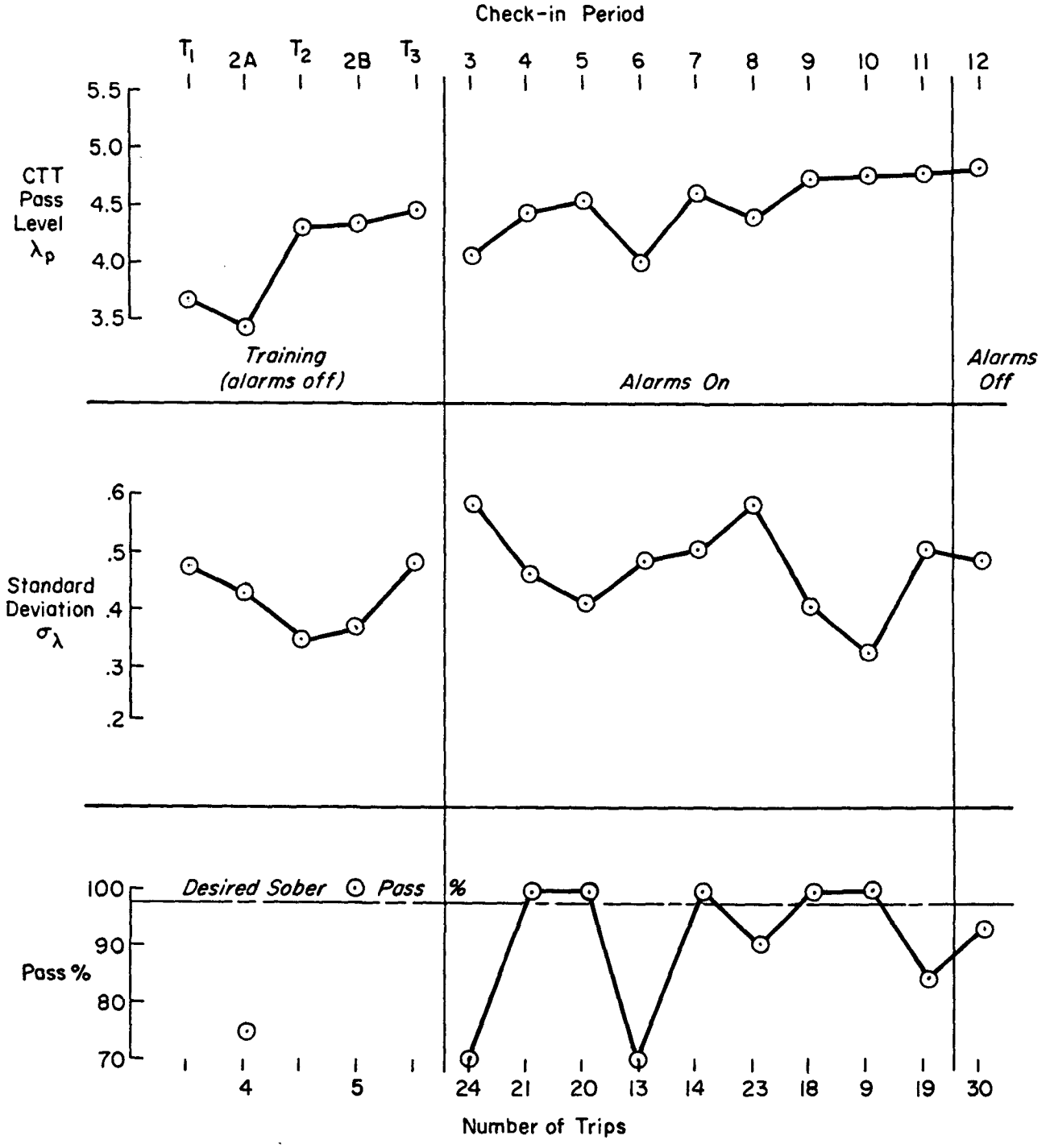
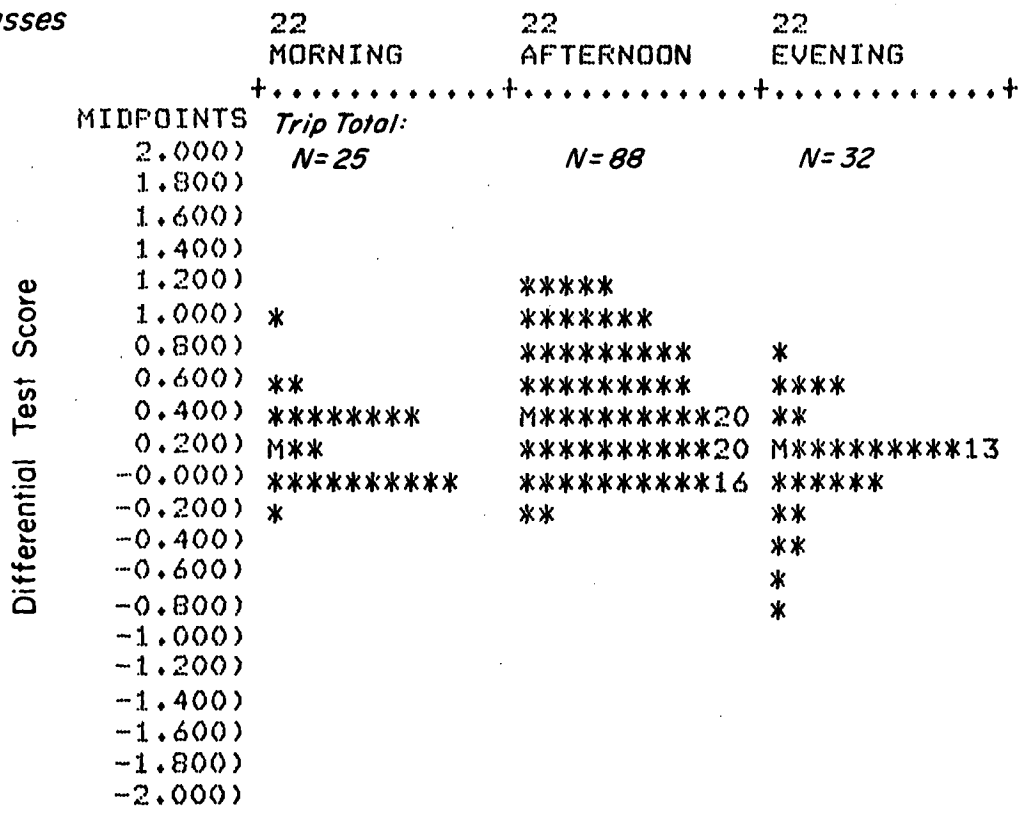


Figure I-57. Biweekly Performance Data for Subject 22

a) Passes



b) Failures

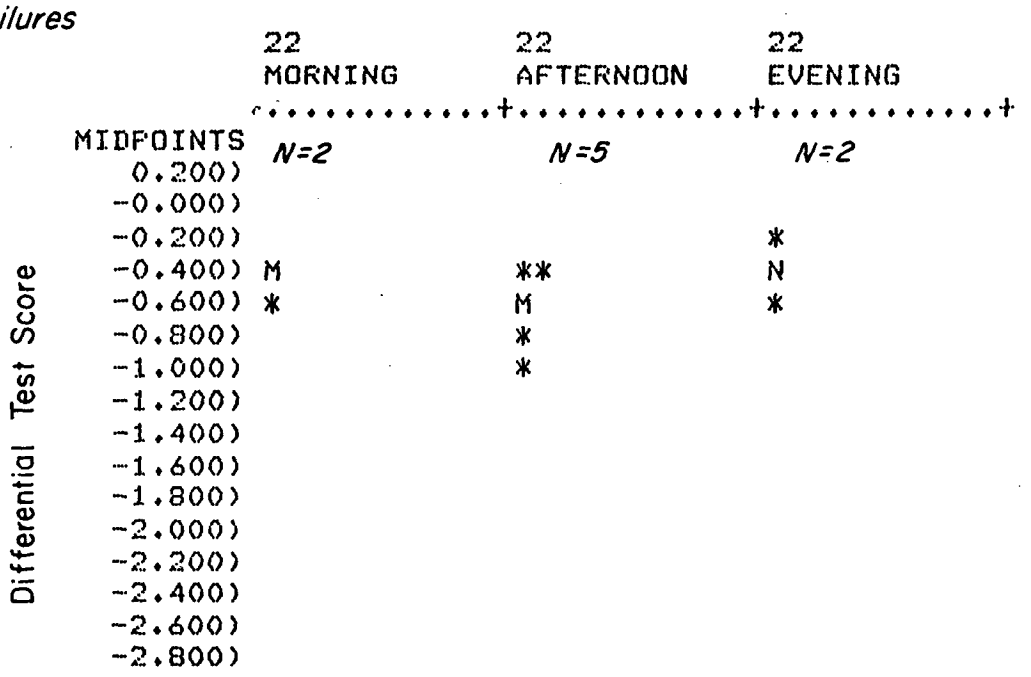


Figure I-58. Differential Test Score Histograms for Subject 22

Subject 23

Subject 23 was assigned to the program, but never showed up. A letter was sent to the court as a follow-up (Exhibit I-5). We originally contacted Subject 23 at the Compton Court where he went through our standard screening. He was assigned to the program and went to the Department of Motor Vehicles to have his license restricted to use of the DDWS/Nova. He never showed up to get the car and a letter was sent to the court as a follow-up.

EXHIBIT I-5

SYSTEMS TECHNOLOGY, INC.

13766 SOUTH HAWTHORNE BOULEVARD • HAWTHORNE, CALIFORNIA 90250-7083 • PHONE (213) 679-2281

In reply refer to:

27 May 1982

To: The Honorable Jerry Johnson
Division 5
Compton Municipal Court
200 West Compton Boulevard
Compton, CA 90220

Dear Commissioner Johnson,

On January 29, 1982, Subject 23 was convicted of violating Section 23102(a) of the California Vehicle Code. As his probation he was assigned to participate in the Drunk Driving Warning System research project.

Mr. 23 does not have a telephone so on May 13th I sent him a letter. The letter was to let him know the car would be ready on May 19 as planned, to remind him to get car insurance, and to tell him to call me immediately. I did not hear from Subject 23. On May 20th I sent him another letter, essentially the same as the first, by certified mail. Subject 23 signed for the letter on May 21st. I have not yet heard from him, so it seems he is not interested in participating and is in violation of the terms of his probation.

I have also informed Subject 23's lawyer, Michael Friedman, that Mr. 23 is in violation of his probation.

Thank you for your continued support of the program.

Very truly yours,

SYSTEMS TECHNOLOGY, INC.

Marcia L. Cook
Research Assistant

MLC/war

APPENDIX J

INFERRED BAC FROM DDWS SCORES

In Volume I a model was developed that relates average or mean CTT scores to BAC:

$$\text{Impaired CTT score - sober CTT score} = \bar{\lambda}_{BAC} - \bar{\lambda}_c = -48\ BAC^2 \qquad (J\text{-}1)$$

Based on the statistical analysis of past CTT experiments, a formula was also developed for the variability or standard deviation in CTT scores associated with the above relationship:

$$\sigma_\lambda = \sqrt{(0.46)^2 + (15\ BAC)^2} \qquad (J\text{-}2)$$

The second formula accounts for the average subject's basic performance variability, an increase in variability with BAC, and differences in BAC effects between subjects. Data and model fits for the above relationships were given in Appendix A of Volume I and are repeated in Figure J-1.

It was also noted in Volume I that the CTT pass level for an individual for a 1 pass out of 4 attempts strategy was set slightly below their sober mean:

$$\lambda_p = \bar{\lambda}_c - 0.1 \text{ or } \bar{\lambda}_c = \lambda_p + 0.1 \qquad (J\text{-}3)$$

Therefore, by combining equations (J-1) and (J-3) we get

$$\bar{\lambda}_{BAC} - \lambda_p - 0.1 = \Delta\lambda_p - 0.1 = -48\ BAC^2 \qquad (J\text{-}4)$$

where

$$\Delta\lambda_p = \bar{\lambda}_{BAC} - \lambda_p$$

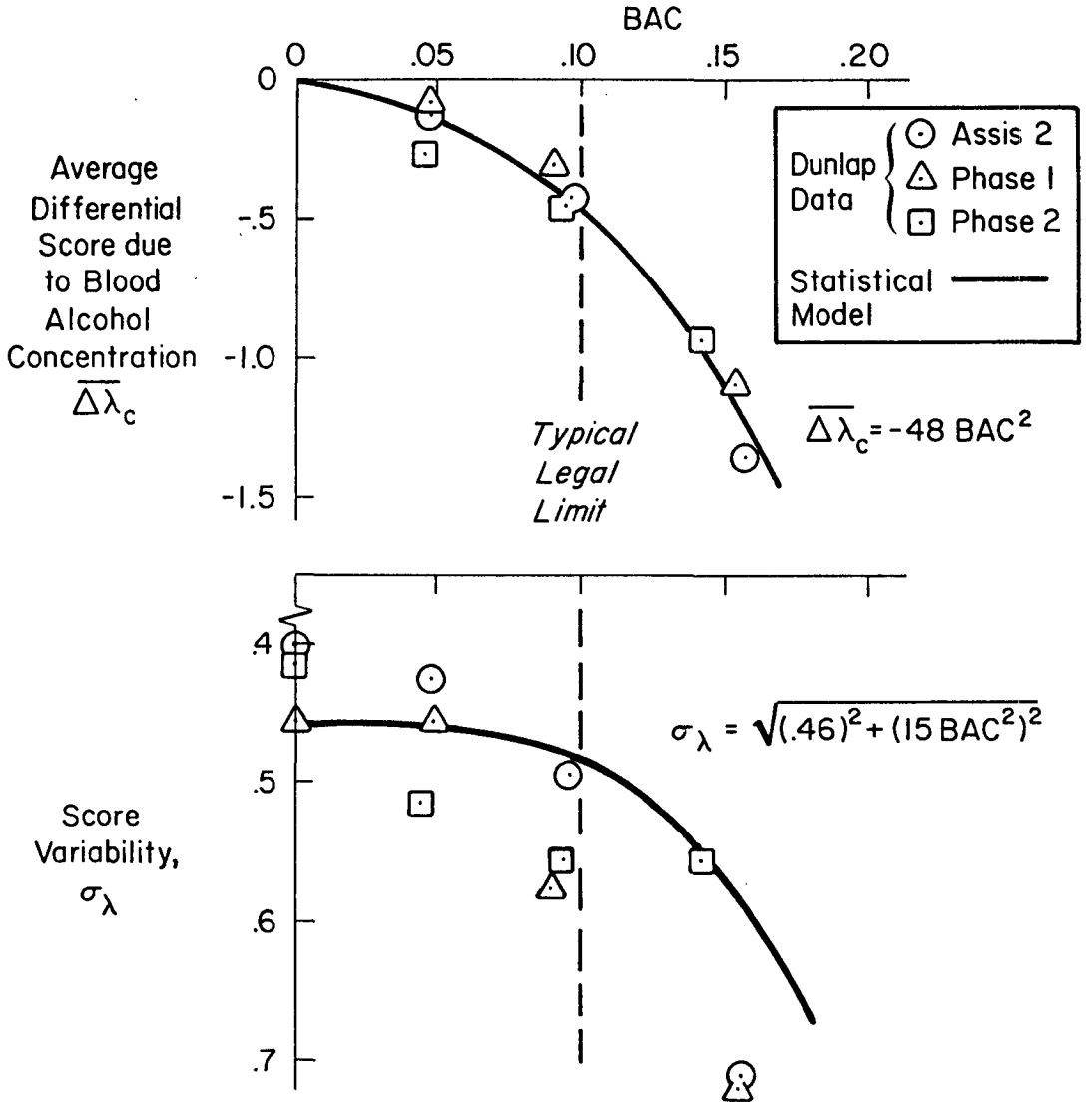


Figure J-1. BAC Effect on the Differential Mean and Variability of CTT Scores

Now solving solving for BAC:

$$BAC = \frac{0.1 - \Delta\lambda_p}{48} \qquad (J\text{-}5)$$

Thus we end up with a formula which allows us to infer BAC given a differential CTT score relative to the pass level ($\Delta\lambda_p$). Since λ_p in Eq. J-4 is a constant, the variability associated with the $\Delta\lambda_p$ equation (J-4) is the same as Eq. J-2.

Since the relationship between $\Delta\lambda_p$ and BAC is described by both a mean value ($\Delta\lambda_p$), and a variability component (σ_λ), statements about BAC inferred from a given score must be tempered by some estimate of the uncertainty involved. This can be handled by deriving a confidence interval for $\Delta\lambda_p$ values. Since we typically would like to state the probability that BAC is greater than some level, we can set up a one sided confidence interval for $\Delta\lambda_p$ scores (Bowker and Lieberman, 1959):

$$Pr\left[\Delta\lambda_p \leq \Delta\lambda_p(BAC) - \frac{\sigma_\lambda K_\alpha}{\sqrt{n}}\right] = 1 - \alpha \qquad (J\text{-}6)$$

Here we state that the probability that $\Delta\lambda_p$ is less than some value $1 - \alpha$ where α is the probability that we are wrong (and thus we want to make α, the chance of error, small). The bracketed term in J-6 states that to infer a BAC from a given $\Delta\lambda_p$ score at a given level of confidence $1 - \alpha$, we must have a score lower than that described by Eq. J-4 by the amount $\sigma_\lambda K_\alpha/\sqrt{n}$. K_α is derived from a table of the cumulative normal distribution function, σ_λ is given by Eq. J-2 and n is the number of trials.

In the CTT field test, subjects failed the test by failing four trials in a row. Thus we can determine confidence intervals on $\Delta\lambda_p$ for n = 4. This is illustrated in Fig. J-2. Here we show a curve for mean differential CTT score ($\overline{\Delta\lambda_p}$) as a function of BAC, and one sided confidence intervals at several values of $1 = \alpha$. The 90 percent curve indicates that there is a 90 percent chance that a given $\Delta\lambda_p$ is associated

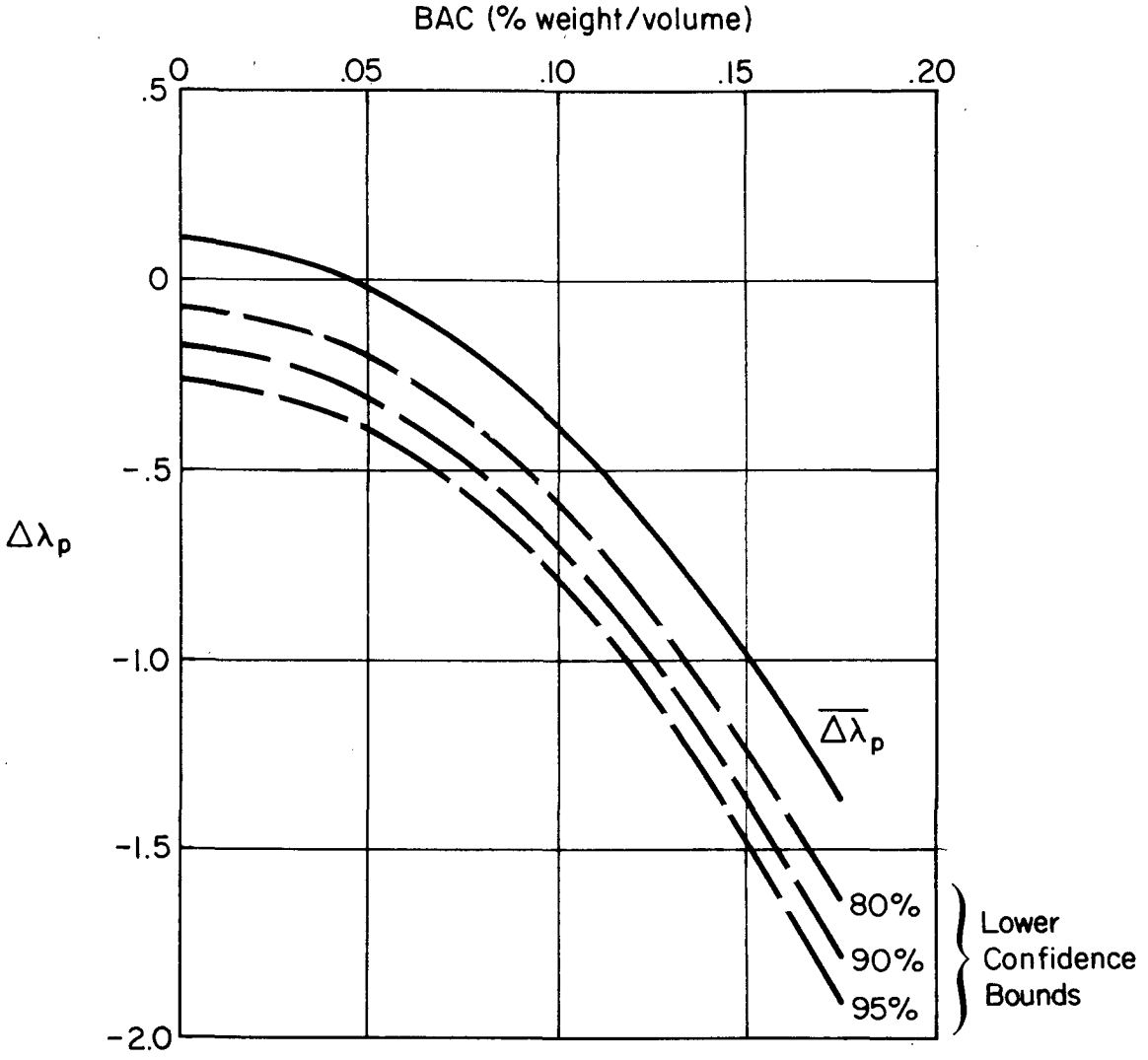


Figure J-2. One Sided Confidence Intervals for Differential CTT Score as a Function of BAC

with a BAC value at or above the indicated value. A 90 percent confidence interval is commonly used, and we will use it here to classify four BAC ranges inferred from $\Delta\lambda_p$ scores.

Classifications are given in Table J-1 and illustrated in Fig. J-3. The 0.05 BAC level was selected as the upper limit of the lowest range because very little BAC discrimination occurs below this level. The 0.10 BAC boundary was selected because it is a common legal limit. The 0.15 BAC boundary was selected to demark the lower limit for severe impairment.

TABLE J-1. BAC CATEGORIES INFERRED FROM DIFFERENTIAL CRITICAL TASK SCORES

DIFFERENTIAL CTT SCORE	BAC RANGE	CATEGORY
$\overline{\Delta\lambda_p} > -0.3$	BAC < 0.05	Sober or Minimal Drinking
$-0.3 \geq \overline{\Delta\lambda_p} > -0.7$	$0.05 \leq$ BAC < 0.10	Drinking but Not Legally Drunk
$-0.7 \geq \Delta\lambda_p > -1.4$	$0.10 \leq$ BAC < 0.15	Drinking and Legally Drunk
$-1.4 \geq \Delta\lambda_p$	$0.15 \leq$ BAC	Drunk and Dangerous

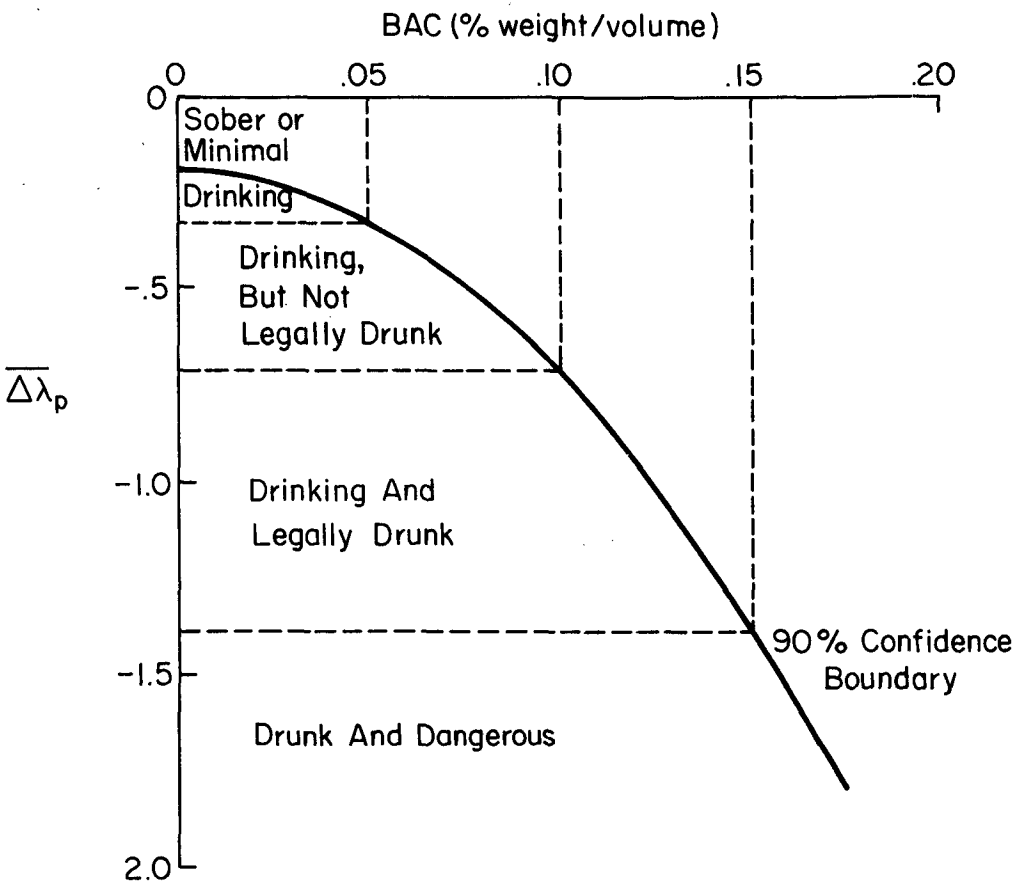


Figure J-3. BAC Categories Inferred from Differential CTT Scores Averaged Over 4